

SUPPLEMENT.

The Mining Journal, RAILWAY AND COMMERCIAL GAZETTE.

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

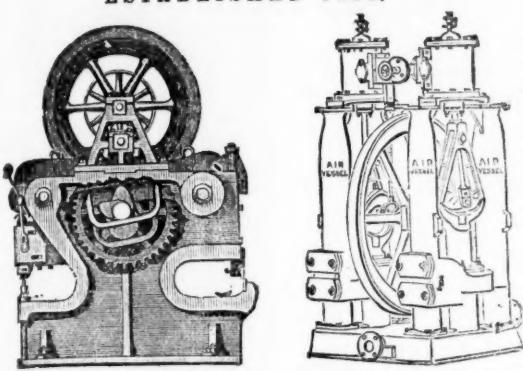
[The MINING JOURNAL is Registered at the General Post Office as a Newspaper, and for Transmission Abroad.]

No. 2234.—VOL. XLVIII.

LONDON, SATURDAY, JUNE 15, 1878.

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Are exclusively used, the advance made during eight consecutive weeks, ending February 7, was 24·90, 27·60, 24·80, 26·10, 28·30, 27·10, 28·40, 28·70 metres. Total advance of south heading during January was 121·30 metres, or 133 yards.

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4.—THEY ARE THE ONLY MACHINES THAT MAKE THE ORE CLEAN
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They have been supplied to some of the principal mines in the United Kingdom and abroad—viz.,

The Greenside Mines, Patterdale, Cumberland; London Lead Company's Mines, Darlington, Colberry, Nantthead, and Ballyhope; the Stonecroft and Greyside Mines, Hexham, Northumberland; Wanlockhead Mines, Abington, Scotland (the Duke of Buccleuch's); Bewick Partners, Haydon Bridge; the Old Darren, Eggar-mwyn, and Ystumtuen Mines, in Cardiganshire; Mr. Beaumont's W.B. Mine, Darlington; also Mr. Sewell, for Argentiferous Copper Mines, Peru; the Brassberg Copper Mines, Norway, and Mines in Italy, Germany, United States of America, and Australia, from all of whom certificates of the complete efficiency of the system can be had.

WASTE HEAPS, consisting of refuse cherts and skimpings of a former washing, containing a mixture of lead, blende, and sulphur, DRESSED TO A PROFIT.

Mr. BAINBRIDGE, C.E., of the London Company's Mines, Middleton-in-Teesdale, by Darlington, writing on the 20th March, 1878, says—“The yearly profit on our Nantthead waste heaps amounted last year to £600, besides the machinery being occupied for some months in dressing ore-stuff from the mines. Of course, if it had been wholly engaged in dressing wastes our returns would have been greater; but it is giving us every satisfaction, and bringing the waste heaps into profitable use, which would otherwise remain dormant.”

Mr. T. B. STEWART, Manager of the Duke of Buccleuch's Mine, Wanlockhead, Abington, N.B., writing on 20th March, 1878, says—“I have much pleasure in stating that a full and superior set of your Ore Dressing Machinery has been at work at these mines for fully a month, and each day as the moving parts become smoother, and those in charge understand the working of the machinery better, it gives increasing satisfaction, the ore being dressed more quickly, cheaply, and satisfactorily than by any other method.”

Mr. BAINBRIDGE, speaking of machinery supplied Colberry Mines, says—“Your machinery saves fully one-half on old wages, and vastly more on the wages we have now to pay. Over and above the saving in cost is the saving in ore, which is a full short of 10 per cent.”

GREENSIDE MINE COMPANY, Patterdale, near Penrith, say—“The separation which they make is complete.”

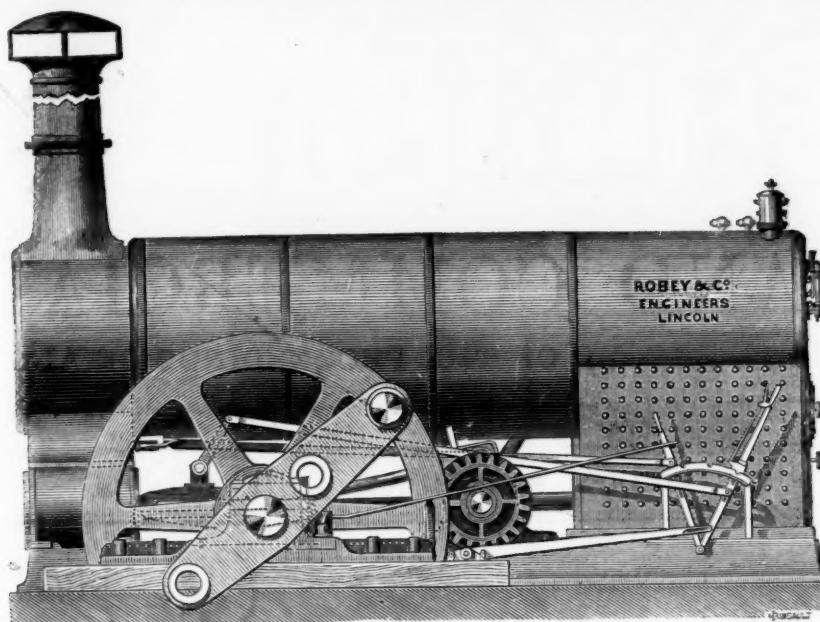
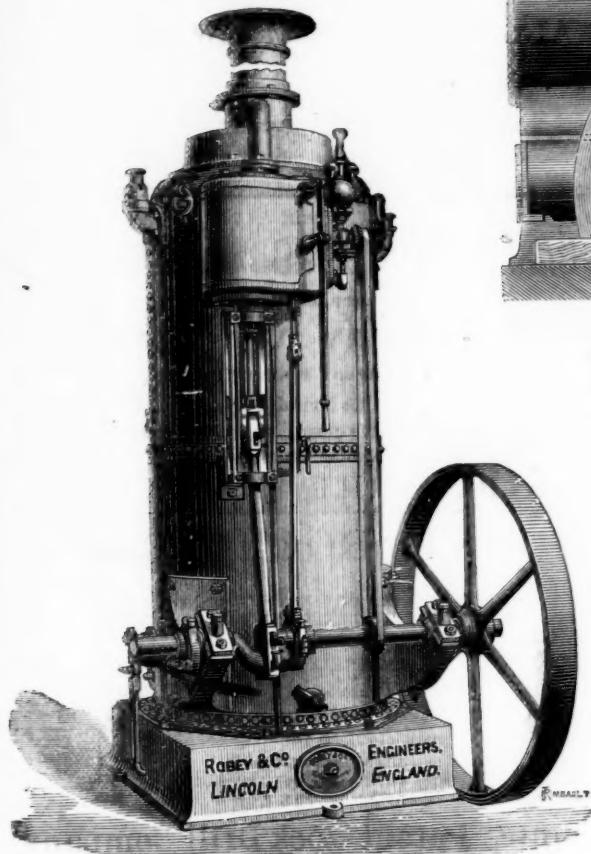
Mr. MONTAGUE BEALE says—“It will separate ore, however close the mechanical mixture, in such a way as no other machine can do.”

Mr. C. DODSWORTH says—“It is the very best for the purpose, and will do for any kind of metallic ore—the very thing so long needed for dressing-floors.”

Drawings, specifications, and estimates will be forwarded on application to—
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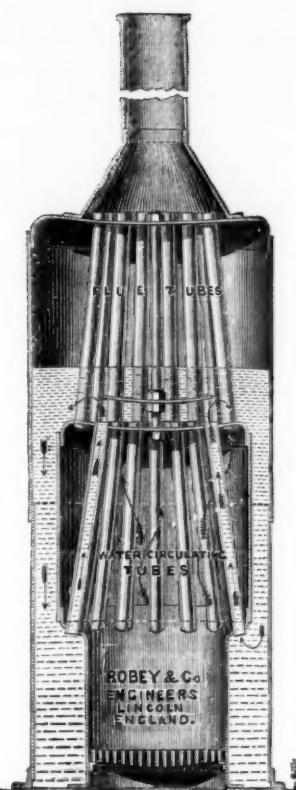
The Illustrations show one of Robey and Co.'s Improved Vertical Engines. All these Engines are supplied with R. and Co.'s New Patent Boiler, as per section illustrated, which has, among others, the following advantages over all Vertical Boilers yet introduced:—

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As the Fans are in a great measure self-contained, the necessary seats and connection with Pit are of a simple and inexpensive character. They can be arranged to be placed below ground when required, and also to work on

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[Estimates and further information will be prepared on receipt of the necessary particulars].

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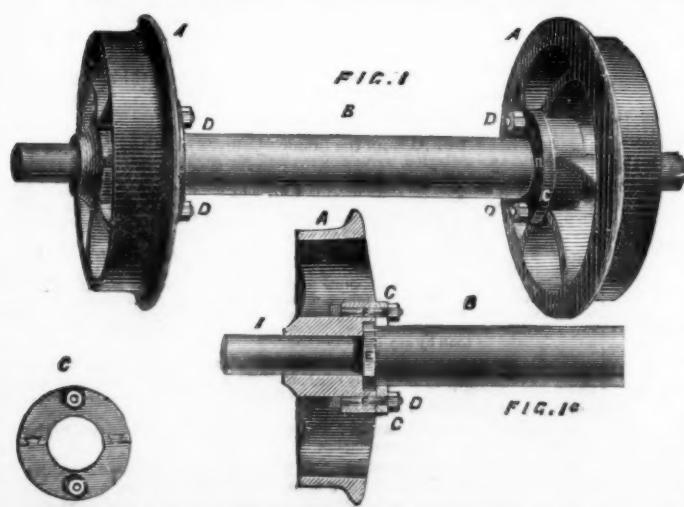
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The Firm, having had an experience of nearly twenty-five years exclusively in the above Special Departments of Engineering, are prepared to advise on any matter affecting the application of Fans or Water Power in Collieries or elsewhere.

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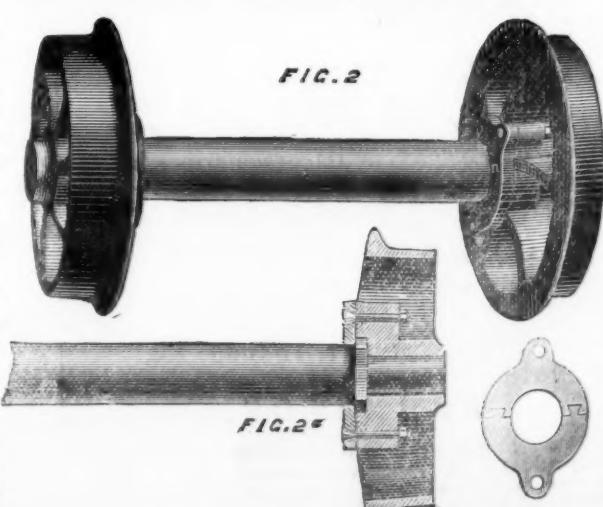
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MANUFACTURERS OF
CAST STEEL AND FILES,
AND
CRUCIBLE CAST STEEL CASTINGS,
Sykes Works, Eyre-st. & Bridge-st., Sheffield. London Office: 118, Cannon-st., E.C.
A New Patent Method of Fitting up Wheels and Axles.



Figs. 1 and 1a show a longitudinal view and plan of a pair of cast wheels and axles fitted up for outside bearings, and Figs. 2 and 2a for inside bearings. A A are the wheels; B is the axle; C C, the washers; D D, the bolts; E, the collar on axle B; and F, the recessed boss in the wheel.

The wheel is cast with a recessed boss in the inside, made to any shape, corresponding in shape and depth with a collar formed on the axle, which is forged of solid steel; the axle is secured into the recess partly by being sufficiently tightly fitted to require driving home with a hammer, and partly by the washer. Around the axle adjoining the boss is fixed the washer, made in two parts and dovetailed, so as to allow of being fixed after the collar has been forged on the axle. The washer is secured to the boss by bolts and nuts, both in outside and inside bearings; in the case of inside, by means of lugs cast on the boss, and the washer made of corresponding shape; the washer is made of crucible cast steel. The only tool required for fitting is an ordinary spanner for outside bearings, and a box spanner for inside bearings.

Now what are the advantages of this method? You secure a simple way of fitting—it can be done by anyone who has seen it—the only tool required being a spanner; the wheels can be detached from or secured to the axle in a few minutes. The next advantage is the perfect solidity attained, the wheel and axle practically becoming as one piece. The durability results from the toughness of the material, and the solidity secured in the fitting. Another thing is the wheels do not need to be put in the fire to detach them, as is the case in ordinary wheels. (N.B.—Our wheels cannot be injured by being heated and plunged into cold water, which would render other steel wheels perfectly brittle as glass.) Saving in fuel and wages is evident—no skilled labour being required to rest wheels in case of a strained axle. By adopting this system colliery owners may save hundreds of pounds sterling yearly.



Original Correspondence.

COLLIERY EXPLOSIONS.

SIR.—Some months ago you did me the favour of inserting a letter on the many and varied ways in which these terrible calamities may arise. During the last six months a vast amount of information has been collected and put into form; many letters have been written and able lectures given all tending to a better understanding of this difficult and exceedingly complicated question. There is, however, one point apparently unnoticed hitherto—the nature of the oil used in the safety lamps. Some of our collieries use animal oil, some vegetable oil, and others mineral. It is a well-known fact that a Royal Commission in Belgium has prohibited the use of animal and mineral oils, and that vegetable oils only are permitted. No doubt there is some reason for their having done so. What is that reason?

It is an interesting question, what oils were used at the time of the explosions in the mines of Pendleton and Blantyre when 250 lives were lost eight months ago, and what oil in the mine near Warrington just exploded? If mineral or animal, then there are grounds for enquiry in favour of vegetable oil. According to my own experiments vegetable oils give a flame of comparatively low temperature that in itself tends to safety.

I am certain a safety lamp can be made that shall give a light superior to a naked light, and therefore induce the men to keep their lamps closed; but it will cost, say 15s., as against half that sum, while all colliery expenses are being cut down to the very last halfpenny. Of course, every light, be it lamp or candle, is a centre of danger; therefore the fewer the better. In Belgium fixed lights in charge of a responsible person are used where practicable, thus lessening danger, for the hand lamps are liable to be dropped or swung, thus risking explosion when gas is present, for a stationary lamp would be safe when the movement of a lamp would fire the mine. Immunity from explosions in mines never will be arrived at, but careful attention to minute details will lessen the number of them; and if vegetable oils are safer than other oils, as say the Belgians, then they only ought to be used. J. D. SHAKESPEARE.

June 8.

AN EXAMINATION INTO THE POSITION AND PROSPECTS OF CERTAIN MINES—No. VIII.—RICHMOND.

SIR.—Since the date of my last letter the directors' report of this company has been issued. Messrs. Bayliss and Steuart, two of the members of the committee, have also addressed a letter to the shareholders. The committee recommend in their report, with the object of putting an end to long and tedious speeches, that whatever information the directors might have to convey to the shareholders should be printed in pamphlet form. This recommendation does not appear to have been digested by the directors, or they may, perhaps, disdain to listen to it. The meetings, however, now called are of a somewhat special character. The ordinary meeting will be one of unusual interest, as a balance-sheet without its equal in the history of the mine will be presented. The extraordinary meeting to receive the committee's report will not be one of the smoothest that has been held, judging from Messrs. Bayliss and Steuart's letter. It is not surprising that the directors have not adopted the pamphlet form of report, as they may think that for the present the shareholders have had as much as they can be reasonably expected to read. Doubtless had the pamphlet been adopted this year it would have looked a small and insignificant production beside the committee's report.

The accounts issued are for ten months ending February 28, 1878. The smelting and refinery works were shut down for four months of the period, dead work only being carried on, so that the actual profitable working time is only six months. The accuracy with which the dead work is set down is surprising when it is remembered that there was "only a memorandum book purporting to show the cost of dead work, but the entries were found to be based more on estimates than on absolute disbursements." The results of the year are truly wonderful, the profit being for that time about £63,000. No other mining company has ever accomplished so much, and the shareholders have cause to be proud of it. The last two months of the year as estimated show a profit of about 1000/- per day. As the accounts are made up to the end of February—that is, for ten months only—the net profit is £105,310/- 4s. 10d. After paying 40,499/- 2s. in dividends, £19,872/- 10s. 2d. in lawsuits, and £932/- 10s. in capital account, the balance, together with that of £33,468/- 19s. 6d. brought forward from last year, amounts to £77,472/- 19s. 2d. A further dividend was paid in May, so that the balance now in hand on the ten months working is £7,222/- 19s. 2d. This success has been achieved through the increased richness of the ore, and the reduction in the working expenses. The committee have no doubt done much in bringing about so great a success. If so much has been done by the mere fact of its existence what might have been expected if the energy which its representatives had been possessed of the full powers of management. The very efforts put forward by the managing director to do his best, as there is no doubt he has done of late, condemn in themselves the entire control of the company. There is proof supplied in the reduced working expenses that they could have been reduced before; there is also proof that if the directors had exercised their power they would have been reduced.

The development of the mine appears to be progressing favourably, although the ore has fallen off considerably in value, being something like \$20 per ton poorer than a short time ago. Whether this is temporary or not is impossible to say, but considering that the value of the ore rose gradually to the highest, and is now declining, it would seem that the richest part of the body being worked has been cut away, and the outside and poorer portion of it is being again reached.

There are three party spirits existent in this company. They may be thus named—the Director, the Cuthbert-Pulbrook, and last, though by no means least, the Directors' Committee. The two last parties coalesce in their strictures on the past management and recommendations for future operations. The disqualification question is strictly between the directors and Messrs. Cuthbert and Pulbrook, and has really nothing to do with the all important one of managing the mine and works efficiently. The shareholders have really no one to thank but those in power for the present state of affairs.

Nothing can be more injurious to a successful enterprise than a divided spirit amongst its shareholders. There has surely been enough trouble from without, as well as from internal sources without an increase of it, which can only prove to be a burden and an annoyance to the shareholders, and ought not to be imposed on them to serve a party purpose. I am speaking now of the disqualification of Mr. Pulbrook. A little calm reflection on the part of the directors would show them that the shareholders of this company have passed through most trying and vexatious times, which might have been averted by the exercise of judicious local management and tact. And now this anxiety of the shareholders is to be increased, which for them has a purposeless object, because, as a matter of fact, it matters not really to the shareholders who serve as directors so long as they are responsible holders, and the duties involved in the directorship are discharged faithfully. The directors do not appear to think so, for they personally have shown a determination to keep Mr. Pulbrook out of the office to which he was elected in August last by the shareholders.

By an error a transfer deed from Mr. Pulbrook to Mr. Cuthbert for 100 shares was sent into the office for registration, and was in due form entered on the books of the company. The qualification of Mr. Pulbrook necessarily became cancelled, but the act of registration was shown to be an error on the part of Mr. Cuthbert's agent, and Mr. Pulbrook accordingly obtained an order from the Common Law Judges' Chambers to "rectify this error by striking out the name of William Cuthbert as the transferee of 100 shares from Anthony Pulbrook." Such an order restored Mr. Pulbrook to the directorial position conferred on him, but the directors have been "advised by counsel to appeal to rescind the order." It is clear, then, that Mr. Pulbrook was an objectionable element on the board, and the directors appear to have made the utmost effort to

keep him out of the position which the Court has really decided is his. It is well known that he is as much acquainted with the affairs of the company as any other member of the board, and his five weeks visit to the mines as a committee man gave him unusual opportunities of making observations and of gaining information most valuable, and which would the more fit him for the office he held—that of director. These advantages are for the moment lost, but the shareholders will, no doubt, confirm his election. I am of the opinion that if the shareholders had been asked candidly, and in an unbiased manner, if it were their wish that the appeal should be made they would have answered, "No." If the directors had been desirous of seeing Mr. Pulbrook continue his good offices to the company, and there were technical or real objections surrounding his peculiar case, and the directors felt they were only conscientiously discharging their duties in enforcing them, could the difficulties not have been overcome by sending a properly worded proxy to the shareholders for signature to meet them?

But then, of course, the directors have had the fact revealed that the shares have been sold, although, so far as the striking out the transferee's name for the 100 shares would not show it. Until proof is adduced that no contract or money has passed between the transferee and the transferor the sale must be considered to have practically taken place, and it would be a difficult matter in the face of the document in the company's hands, which has a consideration on the face of it of 700/-, to disprove the sale. Until these identical shares are sold to Mr. Pulbrook the possibility is that he cannot have a legal right, resting in these shares, to sit on the board. If the shares have really been sold, and a duly executed deed of the sale is known to exist, Mr. Pulbrook, though appearing on the books, may not be considered a responsible shareholder; so the directors, after all, may prove to be legally in the right in opposing him. I have gone out of my course in discussing this matter, but it forms a large part of the directors' report, and is, therefore, one of much interest to the shareholders, most of whom are, doubtless, readers of your valuable Journal.

From the letter of Mr. John Bayliss it is evident that the committee mean business; their manly and straightforward conduct ought to be supported by everyone who has the true interests of Richmond at heart. The committee have sacrificed much in doing their work, and the "two or three recommendations of the committee" to which the directors object may be most vital ones. One thing now is clear, the directors are opposed to the committee. It seems as though the directors have a fear of meeting the committee on fair grounds. If the directors think there is any danger in carrying out the committee's suggestions it ought to be known what it is; it is dangerous. The danger they may fear will not decrease but increase. It may be naturally expected that there will be a great deal said in defence of the management. We may, perhaps, hear that the mine has been managed as well as any other mine. Certainly the results have been good no one will deny, although they fall short 5 per cent. per annum of the 18 per cent. per annum held out in the prospectus. It must not be forgotten that it is a mine unsurpassed for richness and resource by any owned by English companies. Given the same concern under able and economical management and the results would not have been 13 per cent. per annum profits but 28 per cent., taking the committee's report as the criterion for this estimate. Delinquencies of the past management ought not to be passed over, but met in the spirit they deserve. Pass them over, and say let "bygones be bygones," you have no guarantee that the evils of management will cease; there is but one remedy—pluck them out by the roots.

8, Drapers' Gardens, E.C., June 12. WILLIAM GABBOTT,
Stock and Share Dealer.

RICHMOND MINE.

SIR.—Thanks to the evidence promulgated by the Committee, it has come to light that though Mr. Probert was aware that Messrs. Clarence King, Price, McGee, and other scientific men had advised that the ground on the 200 ft. level should be prospected, yet when he (Mr. Probert) was appointed managing director in December, 1875, he caused all the explorations in which Mr. Rickard had been so skillfully and pertinaciously engaged during the year to cease, and it was not until the shareholders took matters into their own hands at the general meeting in August, 1877, and appointed a committee to go and visit the mine, that Mr. Rickard was allowed to continue the explorations towards the quartzite, and which have given the magnificent returns alluded to in the report just issued. It is my firm opinion that had it not been for the action of the shareholders in the appointment of the Committee we should have drifted into impecuniosity, and then the mine would have slipped through our fingers into the hands of parties who knew its value.

It is not necessary for the shareholders to discuss at the meeting to be held on Tuesday, whether Mr. Probert is a chemist, a mineralogist, or metallurgist. Firstly, let us ask ourselves have we confidence in our managing director? I unhesitatingly say that I have no confidence. Let that be the first question put to the meeting, and having answered that in the negative we will call upon the board to resign. We can then proceed to elect a new board, inviting any of those whose services we wish to retain to take seats thereon. It behoves every shareholder who wishes to form an opinion for himself to read attentively the Committee's exhaustive report, otherwise let him kindly send his proxy to the Committee. I am aware that bulls and bears and birds of prey are anxious that the management should not be changed, but the interests of these animal antagonists to those of investing shareholders. A great deal of money has been lost by shareholders and gained by market operators consequent on the ups and downs of the shares on the market; but speaking in the interest of shareholders who buy their shares as a speculative investment, we want a manager who will not forestall the market, and who will not speculate in his trust. We also want a board which will act conscientiously, and which will not betray its trust, as the present board are said to have done in having, contrary to the advice from legal advisers and counsel's opinion, made a contract (that of the Rozan process) with our managing director, Mr. Probert.

SHAREHOLDER.

RICHMOND MINING COMPANY.

SIR.—I have no desire to anticipate the opinion of the shareholders upon the committee's report, nor should the committee have done so either, by applying, as they have done, for the proxies of shareholders, a very unusual course indeed, as it appears to me, for employees to have taken; but as correspondents in the mining papers, acting as I infer in concert with the report of the committee, have been pressed, very unnecessarily I submit, to introduce my name into the discussion, you will permit me, perhaps, to say that I am not in any degree related to Mr. Probert, nor that the matter in itself is of much moment. It justifies me, however, in saying that if the other facts and faults paraded against Mr. Probert by the committee are based upon such fallacious grounds, and have been obtained by such indirect and unreliable means, that the shareholders may well put the whole report aside as unworthy of their faith and confidence.

I hope, in return for the undue prominence which has in this controversy been assigned to me, to be allowed to point out at the meeting of shareholders on June 18 that Mr. Probert still deserves their confidence, and that, divested of the personal rancour of the committee, the scientific commentary which is obviously not their own, raises only one distinct issue—whether the refinery should be at Eureka or elsewhere; another would have been whether the Rozan or Patteson process is the more desirable. But as Mr. Eilers represents them to be one and the same process, the point is not arguable unless it be to consider the merits of some other systems.

If the committee should succeed in removing Mr. Probert, and the board too, for such appears to be their scheme, they should candidly state in their report how they propose to supply their places; this may possibly be a surprise reserved for the meeting. Of themselves we may fairly infer they have not the competent skill, and are certainly deficient in judgment. Then, who are to be their nominees?

The property is now a good one; the six years struggle it has had presents vicissitudes and events to the recollection of old shareholders reminding them how nearly and how frequently the company was about to be wound up, and how, but for the courage and

judgment of Mr. Probert, and the brave unselfishness of the board it would now be but a matter of painful memory.

Is the cup to be dashed from our lips, and are strangers and would-be appropriators to reap our harvest? J. P. BRIDGATER. Boston Gardens, June 13.

THE RICHMOND MINE.

SIR.—Shareholders who consider their own future welfare and peace for this mine will hardly hesitate to give their utmost support to the directors. The mine is doing as much as a mine can well do, and at very heavy expenses, and surely we can "let well alone." At any rate, to give Mr. Probert his passport just now looks much like "killing the goose that lays our golden eggs."

COUNTRY SHAREHOLDER.

RICHMOND CONSOLIDATED MINING COMPANY.

SIR.—It is said that those who live in glass houses must not throw stones; yet to throw light upon the recent litigation between the Richmond and the Eureka Companies the committee of investigation have had a glass model of the mine made similar to the one exhibited at the late trial, giving an exact representation of the Richmond and Eureka Mines from the surface to the lowest levels, and showing why it is impossible that the Richmond Company can hope that the Supreme Court will reverse the decision already given against them. Dissatisfaction is expressed by the committee that only £80,768/- out of the £1,600,000/- worth of ore raised has been given to the shareholders as dividends, but surely 11½ per cent. profit, which as the committee declare this £80,768/- represents, is not so very bad, especially as they explain that other £83,000/- have been transferred from revenue to capital account.

The committee's report, which cost over £100/- to print, is made up chiefly of extracts from the business correspondence between the London and Eureka offices, which ordinary men of business would have considered should never have been made public in the way it has—that is, in such a way as to induce the opinion among the Richmond employees that the managing director is an imbecile, and the board in London rather worse than he. It is usually supposed in business that "experience makes fools wise;" it is a pity, therefore, the committee could not wait for the result of experience to have produced effects. Mr. Probert has been some time at the mines, and it is not unreasonable to suppose that he has been able to ascertain when and how far recommendations made in 1873 ought to be carried out. Of course, I do not know the reason of one or other step which he has taken, but I know enough of mining to be able to say that to rake up old reports and recommendations of itinerant inspectors and discharged servants and dangle them like bull-fighter's red cloak before a servant, who, for the time being is working the mines profitably and well, is not the best possible way of getting the most hearty services out of him. At the present time the opinions of Clarence King and McGee may or may not be applicable. I am inclined to take Probert and dividends in preference to the committee's investigation and litigation, and I believe the majority of the shareholders will be inclined to go with me.

As to the hydrocycles, I am not surprised that Mr. Eilers, an imported German-American, should condemn them, since I understand they are not German inventions, and we all know that in obstinacy and chauvinism the German miner and metallurgist is surpassed only by the Cornishman, though most Cornish and German inventions are remarkable only for their clumsiness and inefficiency. The chapter in the committee's report, taking for example the twelfth and following verses, clearly shows that Mr. Probert has been careful to let the full board of directors know every step he has taken. The owners of the Rozan process should treat with a public company, and that they should do decline is only reasonable. To have sold the whole of the United States patent rights to the Richmond Company would have reneged these rights at once; to have sold the Richmond Company the bare right to use the process would have rendered it impracticable to sell the American rights to others, except subject to the Richmond agreement, which would have depreciated the saleable value. Let us assume that Mr. Probert has made an arrangement which upon strictly legal grounds he should not have done, what can it matter to the company? Messrs. Rozan would not deal with the company, and, therefore, the sole question is the company's right to whether such company would deal with Mr. Probert—a man they know—or with some stranger, who would, no doubt, have acquired the American rights, and of whom they would have known nothing. The Richmond Company "don't want to fight," although they have a colonel to direct the military operations of the committee of investigation, and a solicitor to advise that amiable body whether one of them may legally strike a blow whilst his antagonist has only his left arm guard in readiness. The Richmond Company will surely be wise enough to know that both the colonel's and the lawyer's advice may be neutralised by the antagonist altering his guard. The Richmond Company only pay royalty of "the most favoured user" on the Rozan patents, so that none but lawyers will be able to see any possible ground for profitable litigation.

The main question for the shareholders appears to me to be whether the Luce and Rozan process gives results satisfactory to the company? At present I do not know whether it does or not, for I do not know what process they are using. If the results be satisfactory it need only be considered whether the company are paying a higher royalty than any other user—if there be but one user paying less the royalty paid by the Richmond should be at once reduced, and all excess refunded. This Mr. Probert would, no doubt, agree to. The committee have prepared a statement of accounts, showing a loss of £4,600/- 4s. 5d. on the refinery; but in order to show this they have expunged 29,579/- worth of bullion and drosses, which properly appear on the "returns" side of the account, and a loss of £32,657/- on the "expenditure" side, which has already been otherwise charged, and which, therefore, is by the committee charged twice over. These two items amount to £62,268/- which suffices to pay the committee's alleged loss of £4,600/-, and still leave £5,666/- available for increasing the dividend fund. In this case, however, the actual cash profit on the single item is of secondary consideration; the great question is whether refining at the mines instead of carrying raw products thousands of miles with very poor means of transit is more profitable. The City merchant who employs a commercial traveller at 1000/- a year salary, and thereby increases his profits 5000/- per annum, does not argue that because nine-tenths of the orders influenced by the traveller come direct to the warehouse, therefore the payment of the 1000/- salary represents a loss of 500/- per annum. The merchant considers it a gain of 4000/-; but this is a commercial detail far beyond the comprehension of the Richmond Committee, though it is well understood by the majority of the shareholders.

Throughout the entire report the style is personally offensive to Mr. Probert, yet in almost every line the committee show their non-acquaintance with even the most widely-known general details of mining and metallurgy. They evidently do not know why a lead is soft or why a softened lead will never be willingly purchased at the same price as a naturally soft lead. There can be no doubt, even from the committee's statement, that the R.R. (refined Richmond) lead is of such excellent quality that it is scarcely distinguishable from naturally soft lead. The presence of an extremely small proportion of silver will make a lead appreciably hard, and as the Richmond mineral is all auriferous silver lead, the fact that it is refined to best soft says much for the efficiency of the Luce and Rozan process, and the shareholders may well conclude that in times of ordinary commercial activity (the depression of the last two years has exceeded anything within memory) the lead alone would give the shareholders good dividends, whilst the gold and silver recovered from it would give bonuses far greater than the dividends themselves.

The Richmond has always been a "market mine" by which I mean that nine-tenths of the shareholders are not legitimate investors, but have become members of the company merely to speculate and gamble in the shares; they care far less for the permanent richness of the mine than for "straight tips" as to an approaching rise or fall in the shares, so that they may "make their book" accordingly. This class of shareholders ruins the best mine in existence, and in that ruin involves the honest investor connected with

alone for the resuscitation of some of the old worn-out mines of the county. To ensure success the working of such new ground should be as in days gone by—on the principle of equitably advantageous co-operation, thus opening a field for the investor requiring but a small amount judiciously expended to ensure the realisation of copper mines of very great value. CHAS. BAWDEN.

Cornwall, June 12.

REMINISCENCES—No. VII.

SIR.—I take it for granted that you will accept for your excellent and widely-circulated Journal not only what I remember from observation and hearsay, but also matters of fact which I have read. Therefore, I will firstly subjoin a few instances of Cornish longevity. Carew has recorded the following:—“One Polzen (says he) lately living reached unto 130 years; a kinsman of his 112; one Beauchamp to 106; John Brawne, the beggar, a Cornishman, by wandering outscorned a hundred winters.” He speaks in another place of one Prake, of Talland, aged 110. The Rev. Thomas Cole, minister of Landewack, who died and was buried there in 1683, is said in the register to have been above 120 years of age. Dr. Borlase relates an anecdote of his walking to Penryn and back, a distance of 30 miles, not long before his death, on the authority of Mr. Erisley, who met him on the road. Michael George, sexton of the same parish, was buried March 20, 1683, aged 102, as is said in the register, upwards of 100 years. Dr. Borlase speaks as is of an old man of the name of Collins, upwards of 100, whom he saw on a tour to the Lizard; this man (Sampson Collins) was buried at Ruan Major in 1754, aged 104. Dr. Borlase tells us also, on the authority of Mr. Scawen, of Molineck, of a woman who died at Gwithian, in 1676, at the age of 104. Her name was Cheston Merchant. The tradition of the place is that she had a new set of teeth and new hair in her old age, and that travellers who came to see her out of curiosity frequently took with them a lock of her hair; it is said, also, that she spoke only the Cornish language, and that she was many years bedridden. Mr. Polwhele mentions Henry Brenton, a weaver, of St. Wenn, who died in the reign of George I, aged 107; Mrs. Trevanion, who died at Bodmin in 1769, aged 107; Mr. Richardson, of Tregony, who died in 1770, aged 102; Mrs. Blanch Littleton, of Lanivery, aged 101 (the three last on the authority of the register); a lady at Egloshayle, aged 112; Maurice Bingham, a fisherman of St. Just, who died in 1780, aged 116; Elizabeth Kempe, of Wendon, who died in 1791, aged 104; Catherine Freeman, Scotchwoman, who died at Trelowarren in 1793, aged 118; John Roberts, of St. Keverne, aged 107; Priscilla Rouse, aged 101, and Edward Roberts, aged 102, both of Manaccan; Mary Sarah, aged 102, and Jane Studford, aged 102, both buried at Gluvias in 1803; Mary Jenkins, of Crantock, then (1806) lately deceased, aged 102 (her father is said to have attained the age of 101, her mother that of 103).

Mrs. Zenobia Stevens, of Towednack, who was buried at Zennor in 1763, at the age of 102, was tenant for 99 years of the tenement of Trevidigia-Werra, held under the Duke of Bolton's manor of Ludgvan-leaze; and we are informed from good authority that when she went on the expiration of the term (being, of course, in her 100th year) to the Duke's court, at St. Ives, she excused herself from drinking a second glass of wine because it was growing late, and she had some way to ride home upon a young colt. Her daughter, Mrs. Barwanath, lived to the age of 98 or 99. Elizabeth Fradd, aged 103, was buried at St. Kew in 1803. Henry Martin, aged 101, was buried at Stithians in 1812.

A lady died in Truro a few years ago, named Cargenwen, aged 105. She had been a widow nearly 80 years, having lost her husband shortly after her marriage. When she was 90 years old, in walking up Lemon-street with a friend, she remarked, “I cannot tell how it is that I cannot walk up hill as I could formerly!” A great-aunt of mine, who died about the year 1840, lived to be 102; one of my uncles lived to be 94, and my father and his two brothers lived to be 90 each (within a few months). My great (maternal) grandmother died aged 96. In the West Briton of the 10th inst. there is a notice of the death of James Knuckey, of Stithians, aged 98; and of Mrs. Knott, of Calstock, aged 101; also of Thos. Symons, Tintagel, aged 89.

I have before me at this moment a book containing this brief paragraph:—“Wadge, of Upton, in Lewannick, a reduced family; the representative of which is now a parish pauper.” This name reminds me of Mr. E. Harvey Wadge, late of Stratford Hall, Ireland, now in America, a convict, who a few years ago held offices in Manchester, and set on mines, &c., in numerous places. His once prosperous career, however, soon ended in disgrace.

In speaking of longevity, I omitted to mention Peter Martin, late of Helston, sexton of St. Michael's Church there, who lived to be about 104. He died about 30 years ago. He used to talk about Mr. Wesley, whom he knew from having, when a postboy, driven to St. Ives, to preach. In crossing Hayle river the horses and carriage swam, the tide being in. When on the water, Mr. Wesley said, “Driver, what is your name?” “Peter, sir,” said he. “Don't fear, Peter, we shall not sink.” Mr. Wesley, on arriving at St. Ives, finding the congregation waiting, did not stay to get dry clothes, but went and preached as he was. His brother Charles used to call him the “iron man” because he could endure, and not succumb under such wettings as he was wont to receive in his travels, which were generally on horseback, till late in life, when he used to travel in a close carriage.

The mention of Helston has reminded me of a few incidents which occurred there long ago. The Wesleyan Methodists held their class meetings, or meeting, in a house in Meneage-street. One evening, when they were assembled in that room, one of the members suddenly rising, said, “We must leave this place; we must not remain here;” and walked out immediately, the rest following him. They had not gone far before the house was blown up by gunpowder, which had been stored in an adjacent room. Was not that a providential escape? An old Wesleyan preacher, who died at Helston a year or two ago, aged about 95, pointed out the spot to me. This incident occurred in Mr. Wesley's time. The preaching-house at that time was at St. John's, near Helston, now occupied as a dwelling-house, and before that used as a carpenter's shop.

The second incident is this: A man called Hammill, a draper, who lived in Coinage Hall-street, was, I believe, a zealous partisan in politics. In conversation one morning with a fellow-townsman something ridiculous was said, which so acted upon the risible faculties of the draper that he died suddenly from irrepressible laughter!

The third is this: There was living at Helston about a century ago a gentleman who was of a very haughty temperament; one day he was dining at the hotel there with a party, including Mr. C. Wallis, a solicitor; the gentleman taking up some pudding hastily, scalded his mouth, which excited an involuntary laugh from Wallis. This circumstance so offended the proud gent as to induce him to send a challenge to Wallis to satisfy his honour! Mr. Wallis, as a man of sense, replied as follows:—“Sir, I have a wife and family to support; if you will make over to them, before we meet, one half of your estate, to be enjoyed by them in case of my death, I will go out to be shot at by you!” That brought no reply. Mr. Wallis gave me this anecdote about 55 years ago.

Opening Carew's History of Cornwall I lighted upon a proverb which is engraved on a stone in Pengersick Castle, in Breage:—

“The lame wyche lacketh for to goo
Is borne upon the blinde is back,
So mazally between them two
The one suppleth the other's lack:
The blinde to lame doth lend his might,
The lame to blinde doth yield his sight.”

The above is several hundred years old.

On every Whit Monday (weather permitting) there is open air preaching at Gwennap Pit, which is situated about 1½ miles eastward from Redruth. It is a circular pit, about 100 ft. in diameter, having concentric grassy seats from top to bottom. In John Wesley's days it was not of the present geometrical shape, but a rough mining pit, probably formed by the caving in of a shaft and shallow excavations. Mr. Wesley preached here for the first time on Sept. 3, 1743; again, April 2, 1744; June 22, 1745; Sept. 4, 1746; July, 1747; August, 1750; 1751, 1753, 1755, 1757, 1760, 1762, 1765, 1766, 1768, 1769, 1770, 1773, 1774, 1775, 1776, 1777, 1778, 1780, 1781, 1782, 1783, and 1789. He says, in his Journal, “I preached in the evening at the amphitheatre, I suppose for the last time, for my voice cannot now command the still increasing multitude. It was supposed there were now more than 25,000. I think it scarce possible that all should hear.” It was his last visit; he died March 2, 1791, aged 88. I attended there yesterday (Whit Monday), where I had not been for about 40 years—on such an occasion. Several thousands of persons were hearers of the sermon in the pit, but many hundreds outside could not hear. All descriptions of vehicles were used for conveyance—omnibuses, cabs, gigs, waggonettes, carts, &c. Refreshments were spread around. It was a day of pleasure there, and at Redruth, and Helston. Whit Monday fair, at Helston, is a grand gathering. Tomorrow (Wednesday) is the great annual fair at Truro; but it is not so well patronised as it was 40 years ago.

June 11.

OBSERVER.

SOUTH DE ERESBY MOUNTAIN.

SIR.—My attention having been called to my report on this mine, dated Oct. 6 of last year, and printed in the *Financial Record* of the present month, in which I stated my opinion that the D'Eresby Mountain lodes with others traversed this sett; I wish to say that that opinion had no reference to the Gorse lode, because the discovery on that lode in D'Eresby Mountain had not been made. The Gorse lode does not run through that sett, but through the Aberllyn, a fact which is supported not only by the oldest and most experienced miners of the neighbourhood but by the tracing of the outcrop and its internal evidences, which I have to-day pointed out to an old experienced miner from London, who has gone with me over and underground in both mines, and who may possibly send you his opinion of the mines. It is preposterous for any “mining authority” paying a casual visit to the place to set up his opinion against one who has examined closely and surveyed every inch of ground.—*Lanwurst*, June 12.

JOHN ROBERTS.

THE LATE DOLCOATH ACCOUNT.

SIR.—Will you allow me to put somewhat more clearly before your readers what I said at the meeting of the adventurers than appears in last week's Journal? I ventured to remark it was my firm conviction that at no very distant period Dolcoath would be in a position to pay 1/- per share dividend (4296/- profit) on the twelve weeks working, with tin ore at 40/- per ton. I have been connected with the mine 27 or 28 years, and had been in the habit of closely studying its points, and at no previous time were the prospects so good. The report now before us shows no less than six shafts and three winzes sinking, of the value of 287/- collectively an average of 32/- per fathom—the most important being the engine-shaft, now down about 12 fms. under the 333 fm. level, or 350 fms. below the adit, about 390 fms. from the surface, which is quoted 89/- per fathom for the length of the shaft.

I referred to some remarks made lately by Mr. Gladstone, which were well worth pondering in their bearing on the interests of Cornish mining at this particular crisis. He said—“The resources of trade and capital are so much increased, and the number of channels into which they can be turned, and the communications of those channels among themselves have been so multiplied, that there is no fear now when any place assumes a bold front and a host of extraordinary progress in some branch of industry, that other places competing with it in that branch of industry will permanently suffer the result of cheapening of commodities and the stimulating of inventions, throwing other places back upon their resources, and teaching them to study how they can avoid the waste which too great a plenty of natural gifts and treasures may have encouraged, as has been the case in some of the mining districts in England. In this we find that the multiplication of those points and centres of production, instead of acting in the end unfavourably, has actually resulted in the increased prosperity of those very centres of production which at first they intended to destroy.”

It should be remembered that neither Dolcoath, nor in all probability any other mine in Cornwall, has up to the present time derived any actual profit or advantage from the use of the boring machines, neither are they likely to do so for many months to come; on the contrary, it has entailed a considerable outlay. That ultimately very material advantages will arise when the ground is fairly laid open no reasonable person can doubt. Whether we may succeed (as Mr. Frank Barratt said at Dolcoath account they are doing in the iron mines in the North of England, in driving at two-thirds of the cost of manual labour) remains to be proved; I see no reason why not. This, with four, five, or six times as fast, will effect such changes that will enable the good old mines of Cornwall to compete with Tasmania or any other tin producing country.

London, June 10.

M. G. PEARCE.

THE LOW PRICE OF METALS, AND THE RESULTS ARISING THEREFROM.

SIR.—From the very high prices obtained for iron, tin, copper, and lead in the years 1875 and 1876, and for a long time previous to it, no other result than what has really happened could have been expected, and it will act as a good lesson to many an older man than the writer to be prepared for such occurrences should they ever again be repeated in our generation, of which I think we have much reason to doubt. That a great many persons connected with mining have felt the pinch from it there can be no reason to doubt; but it is equally doubtful whether in the long run greater benefits may not be derived from it than, let us hope, the temporary mischiefs it has occasioned. Let us look at some facts connected with the case. Some of the greatest and best of the tin mines in Cornwall, when they were getting from 70/- to 80/- per ton for their ore, were dividing money amongst the shareholders, leaving an indebtedness to their bankers and merchants of more than 20,000/- sterling. Had the price of metals continued there can be but little doubt this hoodwinking of the shareholders would have continued; but once those parties who allowed these things to be done saw the perilous position in which they had placed themselves, and not only themselves but all those connected with them, they were bound by common honesty, and more so for their own safety, to lay bare the whole truth—and it is most fortunate they did so as soon as they did, as they were met in a much better spirit than could have been expected by their co-adventurers, and in such a manner as would not have been the case if the affairs were in the hands of less magistrates. It has, therefore, been the means of conducting business in cost-book mines on a proper footing, and in the manner it was intended by the rules of the proper Cost-book System. But, again, let us look at the cost of then producing the ore with the cost of producing now, and we shall find that the ore is now produced at one-half the cost it was then brought to market; and this alone is sufficient to show into what a disgraceful method of working most of the Cornish mines were then being carried on. No boring machinery, no attention to the proper cleaning of the ore, nor the waste of tin that was daily sent away from the different mines for others to make a fortune on.

Fortunately, necessity has no choice than to use economy in working, apply the right working power, and to properly dress the produce of the ore, to obtain results which they never dreamed could be obtained; but if they think, or rather if it is thought, that anything like perfection has been obtained in the working of the great mines in Devon and Cornwall I will venture to assert as much remains to be achieved, and can be achieved with proper attention, in the next three years as has been effected in the past.

In looking over the Supplement to the *Mining Journal* of May 25 “Omicron” says—“I have known Gross and West in daily attendance until the engine was ready to work—working and examining the parts;” and so have I known these gentlemen to be so employed, the former being a relative of mine. If we had more of such gentlemen and less interference with them of the now great mine managers, who, of course, must know everything from a 14 in. cylinder steam-engine down to a penny whistle, we should see the duty of steam-engines. What it was when I left the county of Cornwall 38 years ago in comparison with which the engines reported that have done more than the average duty by Mr. Lean, in the *Journal* of last week, would cut but a sorry figure. It is almost laughable to hear a lot of people doing nothing but complain and

grumble, making certain of better times and prices. The sooner all this nonsense is given over the better. Let us stick to work in a proper way, and we can contend successfully against the Spanish mines with lead, against the Cope and other rich mines with copper, and against the Australian mines with tin; and those who are not prepared to produce these ores with the best methods now known and being adopted for doing so must succumb to the times—and the sooner that all know they have an uphill battle to contend with, not for a day, or a month, or a year, but for all time as far as we are concerned, will do well to look the facts of the matter in the face. We have the sinews here in good workmen, and it only remains for those who steer the ship to know how to use the compass to land them safely, and those who do not must reach a rocky shore.—*Aberystwith*, June 12.

ABSAJOM FRANCIS.

GREAT DEVON CONSOLS—THE FIVE-WEEKS ACCOUNT.

SIR.—I have observed the proceedings of this company as reported in last week's *Journal*, and beg to differ with the Chairman that the five-weeks account to the working miner is a mere matter of sentiment. During the 20 years I was among them in harness I often felt it most severely, and have hundreds of times heard it characterised as the “accursed five-weeks account” by the most moral and considerate among them. To the tributaries the loss is not so heavy; but its great length even to them is a serious source of annoyance, and to “day men” also—whilst to the tutwork men it is a positive loss, as it is well known that the agents are bound to make as near an average of the monthly expenditures as possible. Mr. Samuda appears to me to suggest wisely.

Birmingham, June 6.

DEVON CONSOLS.

SIR.—The very able remarks which have appeared in your Journal from “Looker-On,” and your excellent *Truro* correspondent, Mr. Symons, likewise “Pro Bono Publico” are all so much to the point that it is unnecessary to say more than that I must add my own protest against our directors in any shape giving way to the most unjust demands of ill-advised men. It has been rumoured that it is the officials (and some of their relatives) and monthly men that are encouraging the miners to “stick out.” If this is so, as it has been suggested, why not have a thorough clear out from the highest to the lowest? There are plenty of intelligent and honest agents and other monthly men, as well as miners, ready and willing to go and take their places at a day's notice if necessary. Besides, if, as has been clearly shown, there is such a large loss on the monthly sales of copper ores, and as the other commodity on hand is unsaleable at a fair price, why cannot we reduce our agency and other monthly men, husband our resources, and not sell any of our minerals for a few months? By this means we should in the end find ourselves great gainers instead of heavy losers. Therefore, as a shareholder, I say employ the smallest possible number of hands at the 12 monthly payments as specified, and let us hope that with a turn in the state of trade we may expect better prices for our ores, so as to save the company from making heavy monthly losses.

Plymouth, June 12.

A SHAREHOLDER.

MINING IN NORTH WALES—PANT-Y-MWYN.

SIR.—As the mining company named in the heading of my letter has almost reached the end of its sixth financial year, and taking into consideration the increased vigilance in superintending the operations at the works, the progressive results with which we have been favoured at various times since the annual general meeting of shareholders in 1877, and the large additional real capital which doubtless accrued at the close of the year 1877 by sale of new shares under exceptionally inviting conditions, I presume I am not premature in supposing that a reasonably good dividend will be declared at the ensuing general meeting in August. However that may be I feel asured from what I have heard, from those most likely to be well informed upon the subject, that the most implicit confidence is placed by the large body of shareholders in the present board of directors and the indefatigable secretary of the company, for endeavouring to secure matters in the manner most conducive to the interests of the members. If not infringing too far upon your space, permit me to offer a suggestion through the *Journal*, which may have an effect equally as good in its result as if forwarded by me direct to the company's executive, with the advantage that no personal knowledge is incurred. I simply allude to the desirability of accompanying the directors' general report and annual statement of accounts, which will be forwarded in due course to each shareholder, with a practical detailed statement from the individual charged with superintending the mine, embracing the chief features and occurrences from July 1, 1877 (the day following the closing of previous accounts). There can be no difficulty in this, as it will merely form a condensed abstract report from his diary of events, which doubtless is regularly posted up daily for his own professional guidance. It appears almost superfluous for me to add that the adoption of the course I have indicated would prove very satisfactory to those shareholders who cannot make it convenient to be present at the annual meeting in Liverpool, either owing to pressure of business, distance from that town, or unavoidable causes, as they would then have a good idea of the manner in which the working details were being carried out, and the prospects presented of realising a sufficiently remunerative interest for the risk run in sinking cash in the company. I believe there are few who do not desire to be recouped fairly in this or any similar concern. The report to which I refer would only (if my memory serves me aright) be a continuation of the system previously adopted when there was a managing director—a post now extinct.

AMICUS.

THE WILD DUCK, OR SPORTSMAN'S ARMS.

“Now that we are mit again,” says Jemmy Dow, “I want to know of any ee can tell how long ago it es since the first engine wor put up in South Frances.” “Iss, sure,” says Old Tom; “I can tell ee; and tes about 56 year ago. Uncle Jemmy Vincent wor cap there, and it wor his son John's house there by “Piece” all the dispute wor, years since then, about the bounds of West Basset and South Frances.” “But,” says Uncle Henny, “lev me tell ee, Old Tom, the first engine put up in South Frances was a good way farder south than where the engine is now, and upon a different lode, nearer Grylls House, and, tho' tes the same sett, South Frances now es a different thing from the lode worked near 60 year ago.” “Well,” says Old Tom, “what you say, Uncle Henny, is very true, but Uncle Jemmy Vincent to his dying day was sure that the south lodes would be good in depth. Tes curious, too, that the first engine in Bolenowe bal was put up the same time as South Frances, and by all accounts, if they sticked to the two main lodes going west under old men's workings and old clay pits stream works, the wor sure to have a rich bal, but their slight trial wor for copper, and if the looked for tin the prize would be found.” “I agree with ee,” says Jas Jewill, “and I often tho' how strange 't wor that people didn't sink old men's works deeper instead of running about for new places. We may think what we mind to, but the old men wor good miners, and discovered all the best lodes in the county, and I'll be bound that no man in the room ever seed an old man's works that didn't produce mineral, and I tell ee more—that there is a purty keenly rich piece of tin ground going west from Bolenowe old bal, and long ago old Kinsman used to be streaming for tin from Troon Moor to Chycarne Moor on the backs of some of the them lodes.” “Iss, sure,” says Old Tom, “and one of them is a little to the south of Old Skease P—house, and I suppose you all heerd what happened to Old Skease when a keeper shop.” “I never heerd'd,” says Jemmy Dow, “so less hab'n, Old Tom.” “Well, you see see 'twas like this here; Skease trusted the people from month to month, and was owed a lot of money, and couldn't get it, so off he went one day to Helston to ax a lawyer if he could get the money. The lawyer said he could, and for Skease to bring his books, and he'd make them pay in no time. ‘But,’ says Skease, ‘I've no books.’ ‘And how do ee keep the accounts?’ says Skease. ‘Very well,’ says the lawyer; ‘bring in the hale-door in chalk scores, says Skease. ‘Very well,’ says the lawyer; ‘bring in the hale-door, and swear to the accounts, and I'll make them pay, and no mistake about

it. So next week away went Skease with the hale-door pon his head, and for fear his hat would rub out the chalk scores he turned the chalk side up. When a got in sight of Helston a thot 'twould be a good plan to touch pipe a bit, and consider to hisself what a would say to the lawyer, and what a would do with all the money, but you see while Skease war trotting along towards Helston there war, unknown to un, the door being upon his head, a gentle dew and fog, and when Skease took up the door he found every bit of the chalk scores washed clean out. So poor Skease had to come home again, and never got a penny, for the rogue, when they knew the hale-door war washed clean, used to loff, and call out after the poor old fellow 'Fire away, Skeasy!' "That's a true story as ever war told," says Uncle Henny, "for I know Old Skease and all his family." "So ded I," says Jan Temby, "but I wonder what had the old men to guide them to find all the lodes the worked upon. War it by streamming, or how? Tes hard to say, no doubt, but I've heerd 'twas sometimes by fire." "Well, says Old Tom, 'lev me tell ee what happened the time North Bassett worked. Gracey P— war out one fine evenen milken her cow, and all at once she see'd a great light. She looked under the cow's belly, and in a corner of a field she see'd a blaze of fire rise out of the earth, and then run all along upon the ground. When Gracey went in she told her husband what she see'd, and he said North Bassett lode must run near that place, and a few days after this the caps war going over the ground before fixing a place for a new shaft. So Gracey went up to them, and axed what the war doing. 'We're thinking,' the said, 'to sink a new shaft.' 'Well,' said Gracey, 'if you want to cut a coose of ore you must sink the new shaft in that there corner,' pointing to the spot where she see'd the blazes of fire, and sure enuf the sinked the shaft in that there spot, and cut a fine coose of ore, and the shaft is caaled Gracey's shaft to this day."—From Cousin Jack's Unpublished MSS.

THE SCOTCH MINING SHARE MARKET—WEEKLY REPORT AND LIST OF PRICES.

During the past week business has been on a smaller scale, owing to the Whitsuntide holidays, as well as the fortnightly settlement commencing; but transactions are now being entered into more freely for next settlement—June 28. Tuesday was continuation day, and particulars of the business then done are given below. There is still universal belief that the troublesome Eastern Question is, owing to the exhaustion of Russia, and the prompt preparations of Great Britain, likely to be quickly settled on a permanent basis at the Congress, and in that case the satisfactory commencement of more active business, and better prices than the past few weeks have witnessed, will receive a most powerful stimulus.

In shares of iron and coal concerns Benhar have advanced 6s. 3d. per share, and Omoa and Cleland 4s. 6d.; also Ebbw Vale and Monkland each 2s. 6d., but Cairn-table are 10s. lower. West Mostyn debentures are still offered, although it is stated that a scheme is now preparing whereby it is expected all the capital necessary to develop this valuable property will be subscribed by the shareholders. In regard to the general appearance and prospects of the iron and coal trades the probability of a time of peace in Europe, recovery in trade in Canada and the United States, and the continued colonial prosperity, are important indications of an improvement. One great blow to these trades was the substitution of steel for many purposes that iron had hitherto been used, but nearly on all hands now the ironworks have been adapted to produce steel, while the long-continued depression has necessarily greatly reduced the cost of labour and raw materials. From the reduced cost of labour, therefore, as well as improved machinery, and the use where practicable of cheap foreign ores, the British iron and coal trade is again in a position to reap the full benefit of the recovery in trade that appears to be about to set in, for the foreign competition may now be considered overcome. Andrew Knowles and Sons are at 5s. 6d. Bolekow, Vaughan, B, 33s. 6d. Brown, Bayley, and Dixon, 8s. 6d. Charles Cammell and Co., 9s. 6d. Cosslett, 17s. 6d. Ebbw Vale, 6s. to 7s. John Brown and Co., 12s. 6d. Llynni, Tondu, and Ogmore, 5s. Nerbudda, 17s. 6d. Rhymney, 19. Scottish Australian, 32s. 6d. to 37s. 6d. Staveley, A, 12s. 6d. ditto, C, 72s. 6d. Thorp's Garrow Hall, 40s. to 60s. West Mostyn (preference), 25s.

Shares of foreign copper and lead companies have been in fair request, but Cape have lost 20s. and Tharsis 1s. 3d. of the late advances. Rio Tinto 7 per cent, have advanced 20s., ditto 5 per cent., 15s., and Yorke Peninsula (pref.) 5s. Tharsis touched 23s., but are again tending upwards. The Cape Copper has announced a dividend of 17s. 6d. per share, payable June 24. Defences have been lodged to the action at the instance of the Huntington Company against Mr. William Henderson and others, in which the company claims to have the contract for the purchase of the mines cancelled, or a sum of 150,000/ paid to them. Cape are at 34s.; Hornachos, 13 to 14; Kapunda, 1s. 3d.; Rio Tinto 5 per cent., 64s.; Yorke Peninsula, 5s. to 7s. 6d.

Shares of home mines are firm but quiet. The next sale of the Glasgow Cardon Company (computed 230 tons) will compare with sales of 240 to 260 tons for last month; and some years past, but it is probable the money realised will be better. Probably the prices of home mines of all kinds are now as low as they are likely to be. Looking at lead mines, which may be considered the most doubtful, it appears the course generally pursued is to raise only sufficient at present low prices to pay costs. This restricted output must tend to harden the lead market, irrespective of that permanent recovery a general revival in trade would bring about. Investors ought, therefore, to begin to lay out their money on an intelligent principle of selection, dividing it over half a dozen well-selected adventures, and this must as a rule pay well, for success in a couple, or ev in one, is almost always obtained, recouping not only all depreciation in the others, but paying as well, handsomely on the money invested in all. The most popular course is dividing the investment between dividend and non-dividend mines, and where an immediate income is desired this is, of course, necessary; but the greatest profits are, perhaps, made in purchasing non-dividend or progressive mines alone. Such of them, it is evident, as are in good districts, with first rate prospects of making discoveries and manage to pay their way or have a margin of profit for developing fresh ground, must have far greater margins for a rise than shares in any of the great dividend mines, which are, as a rule, so fully proved that their value, future and present, is fully calculated in the prices of the shares. It must not be lost sight of that success does not depend only on the intrinsic value of the mine; there must likewise be ample capital for development, and an intelligent expenditure thereof. There are not, certainly, many of these small progressive mine shares we are alluding to, but still—scattered here and there in good districts—they can be found, and mostly in the hands of local holders.

Roman Gravels is said to be looking well in all the south levels; this is one of the sure dividend-paying mines of the country, for it is yet in comparatively shallow workings, while the rich deposits of ore may extend to a great depth. At North Roman Gravels the level is being driven as fast as possible from the new lode to meet its junction with the sump lode, believed to be the western extension of the Great Salford beach vein, where a great deposit may be at a very shallow depth, the forebore being in a very good 6 ft. wide. North Hendre is stated to be following the general plan and holding its ore for better prices, selling sufficient only to defray working expenses. It will be remembered that this company lately acquired an adjoining property, one of the first likely to benefit by the success of the Halkyn district drainage scheme. Gorsedd and Merlyn Consols is another of the mines pursuing the same course with its lead. The operations there are generally progressing very satisfactorily, and great hopes are formed about the latest dis-covered new lode, the forebore in the upper level being in very rich ore. Rhosneigr and Deep Level share are in great demand, particularly the latter, at 50s. to 70s., as it is said they will go to 80s. soon, and 100s. in a few months, owing to the Halkyn district drainage tunnel rapidly decreasing the distance between the old lode and the others known to run through this property. This old lode is the one which returned the first Marquis of Westminster nearly 2,000,000/- sterling as profit, in about 18 years working. If known in the chief markets these shares would no doubt be run up to at least three times their present price. Another of the best regulations in the kingdom is Rhyd Alyn. The old mines were among the richest in Flint before drowned out, but if successfully drained by the drainage company's tunnel they would have a heavy rise—200/- or 300/- each. Bampfylde, 8s. Bodmin, 17s. 6d. to 28s. 6d. Comberbank, 8s. D'Eresby Consol., 10. Gunnislake (Clitters), 18s. to 20s. Pateley Bridge, 45s. Rhyd Alyn, 30. West Tankerville, 9s., and ditto (pref.), 20s.

Shares of gold and silver mines the principal dealings have again been in Richmond, which have a 1d. at between 11s. and 13s. This week's run is 86s. 00, or 21s. 00 less than the previous week's, one day having been lost repaying machinery. The accounts recently issued show a net profit of 105,000/-, but for the ten months ended Feb. 28 last the works were only going six months, so for that period such a profit on the share capital of 270,000/- is immense. The debentures need not be considered, for they fall due next March, and must be easily redeemed. Riches such as are here disclosed must not dazzle the investor to forget the unstable nature of all such properties, more especially if the attention of the management is to be distracted with internal dimensions. St. John del Rey lower, at 3s. 6d., though this includes the dividend at 17s. 6d. per cent. to be declared at the meeting on June 26. The produce of Don Pedro for May is 15,000/- cts. Bird-eye Creek are at 15s. Eberhardt, 7s. Emma, 2s. 6d. Flaggstaff, 18s. 6d. Frontino, 35s. Javali, 6s. to 8s. Pestarena United, 4s. to 5s. Rossa Grande, 2s. 6d. South Aurora, 2s. 6d. to 5s. United Mexican, 6s.

Shares of oil companies are very firm. Dalmeny, 5s. higher. Young's Paraffin in request on the approaching meeting to-morrow. Uphall is now quoted ex dividend, and sharp as the rise has already been on these shares, competent judges look for them being 10 before long.

In shares of miscellaneous companies there have been few transactions. Cheshire Amalgamated Salt, 9 to 11. Hopkins, Gilkes, and Co., 9s. 6d. Miner's Safe, 8s. 6d. New Bembery Phosphate, 6s. Starbuck Wagon, 13. Scottish Wagon (new), 9s. to 82s. 6d. Chemical companies' shares are generally firm, excepting Llwyd's, which are easier at 7s. 6d. ditto, 7 per cent. (pref.), unaltered; Langdale's, 9s. 6d.; and Newcastle, 2s. to 25s.

HALKYN DISTRICT DRAINAGE COMPANY.—This undertaking, of which the Duke of Westminster is Chairman, is proceeding most satisfactorily with the driving of the tunnel at an average of 50 yards per month. It is now on a well-known cross course, and at any time the drainage may be effected of some or all of the various mines. This will cause a great rise in the Drainage Company's shares, as its royalties do not depend upon the market price of the clean ore, but, as fixed by Act of Parliament, are 2s. 10s. per ton on all ores raised from mines drained by its operation in a certain area, and 1s. 10s. outside of that area. Owing to the early prospects of this scheme being a success Rhosneigr shares are being well held, for judging by the mine's former richness they would be able to pay handsome dividends at once, and most of the valuable machinery erected on the mine

from time to time could also be realised and treated as profit. Rhyd Alyn is another of the first mines that will be unwatered under this scheme, and enable the proprietors to open out increased wealth, for it has already yielded about 400 tons of lead ore per month. They got 16 tons last month from a new lode above the water level, and 12 tons were sold. This was in the western portion of the sett, and reserves are being rapidly opened up. In the eastern portion every fresh run met with richer than the last. This mine has decided to come under the Limited Liability Acts, and is being privately registered.

LEADHILLS SILVER-LEAD MINING AND SMELTING COMPANY (Limited).—The development of this company's mines is being vigorously carried out, and several important points are now being proved. The price of lead is very much against them, and the ore raised is being held for a better price, which it is to be hoped the more promising appearance of politics will bring about. In regard to the gold portion of the property, it is expected to yield some measure of success, as the ancients took half a million sterling out of it. A dividend of 3s. per share has already been paid for the current half-year, and further dividends depend on the result of the sales of lead.

The following calculations show the yield per cent. on money invested at present prices in the shares named, based upon the last average yearly dividends, being maintained:—In iron and coal companies Andrew Knowles and Sons would pay 14s.; Bolekow, Vaughan, A, 5s. 6d.; ditto, B, 5s. C. Cammell and Co., 8s.; ditto, 6s. per cent. debentures, 5s.; ditto, 5 per cent. debentures, 4s.; John Brown and Co., 8s.; ditto, 5 per cent. (pref.), 5. Parkgate, 3s. 6d. Sheepbridge, 7s.; ditto, (new), 6s. Staveley, A, 6s.; ditto, B, 5s.; ditto, C, 6s.; ditto, D, 5s.; ditto, 5 per cent. (pref.), 4s. In wagon companies Birkenhead would pay 8s.; British, 8s.; Metropolitan, 9s.; Midland, 6s.; North Central, 7s.; Sheffield, 7s.; ditto, 6s. per cent. (pref.), 6s. and Yorkshire, C, 7s. Great Laxey Mine would pay 10s. and St. John del Rey 11s. In miscellaneous investments Earle's Shipbuilding may be mentioned to pay 7. Lawes' Chemical 7 per cent. (pref.) minimum, 7. Liverp. of Rubber, 7s.; Miner's Safe, 8s.; and Runcorn Soap and Alkali, 3s.

THE OLD GROSVENOR MINE.—Since last report the lode in the eastern shaft has much improved, being now worth 12 cwt. per fathom, and consisting of white Limestone mixed with black fossils, carbonate of lime, and yellow clay, mized with lead ore. From these pretty reliable indications the probability is that a good run of ore is not far off. Fair progress is being made in sinking the shaft, owing to the ground continuing very easy.

On contango day (Tuesday) the following were the rates of continuation current:—Contango: 1d. on Glasgow Cardon, 1d. on Port Washington, 1d. on Huntington, 1s. on Monkland Iron, 7s. 6d. on Richmond; even 3d., 4s. 6d., 3d. on Uphall Oil; 6d., 9d. on Young's Paraffin.—Backwardations: 1d., 3d., 31 on Tharsis. On comparing the making up prices fixed to-day for the shares mentioned with those of the previous settlement, the variations shown for the account are as under, and show the decided return of confidence that has set in amongst investors. Richmond has advanced 3s. per share, Up'nt Oil 1s. 7s. 6d. Tharsis (new) 7s. 6d. Tharsis and Young's Paraffin each 1s. 3d. Omoa and Cleland 4s. 6d. Oakbank Oil 4s., also Glasgow Cardon and Monkland Iron each 2s. 6d. In no case has there been any fall, but Canadian Copper, Port Washington, Huntington, and Marbella show no alteration.

Subjoined are this week's quotations, &c., of mining and metal shares quoted on the Scotch Stock Exchanges:—

Capital.	Dividends.	Rate per cent.	Description of shares.	Last price.
Per share.	Paid	per annum.	Previous.	Last.
10	2s.	£ 7 ... £ 7	Arniston Coal (Limited)	7
10	10	4 ... 4	Benhar Coal (Limited)	5s. 16s. 3d.
100	50	22s. 6d. 31s. 6d.	Bolekow, Vaughan, and Co. (Lim.) ... A.	5s. 5s.
10	10	10 ... 10	Cairncale Gas Coal (Limited)	8
10	10	4s. April, 1876	Chillington Iron (Limited)	6s.
23	20	10s. Dec., 1874	Ebbw Vale Steel, Iron, and Coal (Lim.)	7
10	6	nil ... nil	Fife Coal (Limited)	70s.
10	10	nil ... nil	Glasgow Port Washington Iron & Coal (L)	32s.
10	10	—	Ditto Prepaid	30s.
10	10	—	Lochore and Capelstrae (Limited)	80s.
10	10	nil ... 3	Marbella Iron Ore (Limited)	50s.
10	10	nil ... nil	Monkland Iron and Coal (Limited)	37s. 6d.
10	10	5 ... 4	Ditto Guaranteed Preference	60s.
100	100	nil ... nil	Nant-Glo & Blaenau Ironworks pref. (L)	19
6	6	nil ... nil	Omoa and Cleland Iron & Coal (L, & Red.)	1s. 6d.
1	1	15 ... 15	Scottish Australian Mining (Limited)	35s.
1	10s.	15 ... 15	Ditto New	18s.
Stock	100	nil ... nil	Shotts Iron	91

COPPER, SULPHUR, TIN.

4	4	—	Canadian Copper and Sulphur (Lim.) ...	4s.
10	7	57s. 6d.	Cape Copper (Limited) ...	3s. 14s.
1	1	7s. 6d.	Glasgow Cardon Copper Mining (Lim.) ...	22s. 6d.
1	15s.	7s. 6d.	Ditto New	1s. 6d.
10	9s.	nil ... nil	Huntington Copper and Sulphur (Lim.) ...	33s. 6d.
25s.	25s.	—	Kaounda Mining (Limited)	1s.
4	4	—	Panmure Copper (Limited)	20s.
10	10	6s. 6d.	Rio Tinto (Limited)	82s. 6d.
20	20	7 ... 7	Ditto 5 per cent. Mortgage Bonds ...	15s. 6d.
100	100	5 ... 5	Do. 5 per cent. Mort. Deb. (Sp. Con. Bds.)	64s. 6d.
10	10	22s. 6d.	Tharsis Copper and Sulphur (Limited) ...	22s. 6d.
10	7	22s. 6d.	Ditto New	16s.
1	1	—	Yorke Peninsula Mining (Limited) ...	5s.
1	1	—	Ditto 15 per cent. Guaranteed Pref.	20s.

GOLD, SILVER.

1	1	—	Australian Mines Investment (Limited)	8s.
5	5	7s. 6d. ... 7s. 6d.	Richmond Mining (Limited)	1s.
10	7	6 ... 15	Dalmeny Oil (Limited)	8
1	1	7s. 6d.	Oakbank Oil (Limited)	42s. 6d.
1	5s.	—	Ditto	12s.
10	10	7s. 6d. 2	Uphall Mineral Oil (Limited) "A" ...	8s. 18s. 3d.
10	10	—	Ditto "B" Deferred	10
10	10	—	West Calder Oil (Limited)	40s.
10	8s.	9 ... 17s. 6d.	Young's Paraffin Light & Mineral Oil (L)	16

OIL.

50	25	5 ... 6	London and Glasgow Engineering & Iron Shipbuilding (Limited)	24s.
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ignite, very conveniently situated in the Valley of the Golo, near the high road. The quality is excellent and quite available as fuel for almost all purposes. Lands on the bank of the Aso and some forests, the whole amounting to several hundred acres, have been secured and would be found very convenient.

We have seen few more promising or better situated properties than this of Ponte alla Leccia, and I have little doubt that it would yield large quantities of valuable ore at an early period if opened out systematically and with enterprise.

It has been observed that at Ponte Leccia, the same as at Monte Cattina, the ore is found in enormous kidneys, or rather in pockets of pyrites and philipsite; in the rocks the ore is in the shape of massive veins, from 6 to 7 in. long. The quality of the characteristic ores of Ponte Leccia is the same as the Florentine cupiferous ore—the Serpentine, the Khaliope, the Euphotides, the Philipsite, and the Gabbro rosso. The celebrated copper mines of Monte Cattina have produced from 1827 to 1843, 3160 tons of ore, yielding an average of 32 per cent.; from 1838 to 1843 the extraction increased in the proportion of 1 to 29; in 1846, 630 tons were extracted; and the total production from 1837 to 1874 was 10,762 tons. During a few years these mines yielded about 150 tons per month, but we have been told recently that these mines were almost exhausted. The ores of Monte Cattina yield from 30 to 50 per cent., and the grey ones reach very often 60 to 69. The average is 32 per cent.

It is not a question of interest which induces us to call the attention of the capitalists and manufacturers to the rich mines of Ponte Leccia. We know the mines of Algeria and Corsica; we know they are rich, and we have taken at random a Corsican mine in order to show that there are heaps of ore of a high percentage which could easily be brought to our market. In another issue we shall describe the copper mines of Algeria, and give full particulars of one of them, St. Marie aux Mines, the largest, richest, and nearest to the coast.

—*The Paris Exhibition, 1878.*

RICHMOND CONSOLIDATED MINING COMPANY.

REPORT OF THE COMMITTEE OF INVESTIGATION.

We have been favoured by a shareholder with a copy of the Report of the Committee of Investigation, which, with its appendix, fills nearly 200 pages, and is accompanied by a handsome series of maps, sections, and views, showing the position of the company's property, and the mode in which it is developed. It will be recollected that this committee—consisting of Mr. George Hopkins, Col. Stewart, Dr. Maybury, and Messrs. S. Bayliss, A. Pulteney, and J. Bayliss—was appointed at the meeting in August, 1877, to enquire generally into the company's affairs and accounts, to make such recommendations as they may think expedient, and to engage professional assistance for use in America. The total expenses, including professional assistance employed and all contingencies, was limited to 3000*l.* At their first meeting the committee appointed Mr. Anthony Pulteney, Col. Stewart, and Mr. Samuel Bayliss, to be a sub-committee to proceed to America; Mr. Brereton, M.I.C.E., being appointed to render them professional assistance, and Mr. Harper Powell as secretary. The entire investigation has been made, and the report produced at a cost of 4097*l.* 18*s.* 2*d.*, the excess beyond the 3000*l.* authorised will have to be voted by the meeting, as none of the items appear capable of reduction (unless the shareholders consider that Messrs. Brereton and Powell, who have received already 1050*l.*, have been sufficiently well paid, in which the additional 550*l.* which it is proposed to give them would be saved) supposing the items to be unchallenged. The 3000*l.* already voted will only provide for the following items:—Brereton and Powell, already paid 1050*l.*; American experts, 497*l.* 10*s.*; printing report and illustrations and sundries, 50*l.*; general expenses, 150*l.* 8*s.* 2*d.*—2197*l.* 18*s.* 2*d.*; leaving only 802*l.* 1*s.* 10*d.* for the fees, &c., of the sub-committee who went to America. This would only give them 267*l.* 7*s.* 3*d.*, ahead, instead of the 450*l.* ahead, which has been charged for them—a reduction which could not be made without serious consideration.

The committee certainly appear to have done their business most completely; indeed, it is a fact that the policy of publishing so much of what must be regarded as the company's private trade affairs has been questioned, but if any investigation be ordered it is as well that it should be thorough and exhaustive. The whole details of an arrangement entered into between the company and Mr. Probert in connection with the use at the mines of the Luce and Rozan process of desilvering lead are given, and it will be for the meeting to determine whether the arrangement shall be continued or otherwise. As the directors defer their comments upon and answers to the report of the Committee of Investigation until the general meeting it is undesirable to publish an abstract of the complaints made against the London management and Mr. Probert, which might be regarded as an *ex parte* statement. Referring to the documents now alluded to, the directors state that "the report of the Committee of Investigation having at length been issued, the directors trust it will receive the careful and impartial consideration of the shareholders; it is, however, so voluminous, and of so extensive and exhaustive a character, that the directors, with a view to a calm and clear elucidation of the proposals therein made, abstain from dealing with the subjects contained in the report of the committee, until the shareholders meet, when the board will be fully prepared to give explanations, where necessary, and to vindicate themselves from what to them appears unmerited censure of their past efforts to direct the affairs of the company.

HEATING A TOWN BY STEAM FROM A COMMON CENTRE

Mr. George Maw, F.G.S. (Lockport, New York) writes—A paragraph appeared in the Times a few weeks ago referring to the experimental heating of the houses of this city by steam laid on from a common centre of supply, and having had, through the courtesy of Mr. Everett, the manager of the Holly Steam Combination Company, an opportunity of examining the works in operation, I desire to communicate the information I have received, as I am convinced that this novel application of steam is destined in a few years to completely revolutionise the heating of buildings in towns, and that heat can be laid on and supplied like gas from a common centre, within almost any reasonable distance, and at a cost much below that of any system of domestic heating in use.

The experimental works in Lockport were commenced last year, and during the late winter about 200 houses in the city were heated from the central supply, through about three miles of piping radiating from the boiler-house, containing two boilers 16 ft. by 5 ft., and one boiler 8 ft. by 8 ft. These boilers were during the winter fired to a pressure of 35 lbs. to the inch, with a consumption of 4 tons of anthracite, costing \$4*1* a ton, during the summer, but one boiler is fired consuming $\frac{1}{2}$ ton of anthracite in 24 hours, and a pressure of 25 lbs. per inch maintained.

The boiler pressure of 35 lbs. in winter and 25 lbs. in summer is maintained through the entire length of the three miles of piping up to the points of consumption, where there is a cut-off under the control of the consumers. The first 600 ft. of mains from the boilers are but 4 in. in diameter. There are 1400 ft. of 3-in. pipes, 1500 ft. of 2*1*/₂-in. pipes, and 2000 ft. of 2-in. pipes. The supply pipes from these mains to the houses are 1*1*/₂ in. diameter, and within each house 1*1*/₂ in. pipes are used. In addition to the cut-off tap from the main under the control of the consumer there is a pressure valve regulated to a 5 lb. pressure under the control of the company, and beyond this is an ingeniously constructed metre, which not only indicates the total consumption in cubic feet of steam, but also the quantity of steam used in each apartment. At each 100 ft. of main an expansion valve, like an ordinary piston and socket, is inserted, allowing an expansion in each section of 100 ft. of 1*1*/₂ in. for the heat at 35 lb. pressure. No condensation whatever occurs in the mains. They are covered with a thin layer of asbestos paper next the iron, then a wrapping of Russian felt, and finally wrapped round with Manila paper, like smooth light brown paper over all, and the whole encased in timber bored out three-quarters of an inch larger than the felt-covered pipes, and laid along the streets like gas-pipes.

The distribution of heat in the apartments is by means of radiators, consisting of inch pipes 30 in. long placed vertically either in a circle or as double row, and connected together top and bottom with an outlet pipe for the condensed water, which escapes at a temperature a little below boiling, and is sufficient for all the domestic purposes of the house, or is used as accessory heating power

for horticultural and other purposes. The steam has also been applied at a distance of over half a mile from the boilers for motive power, and two steam engines of 10-horse and 14-horse power are worked from the boilers at a distance of half a mile, with but a slightly increased consumption of fuel. The laid on steam is being also used for cooking purposes, for boiling, and even baking, and is witnessed in a house three-quarters of a mile from the boilers a bucket of cold water raised to boil in heat in three minutes, by the passage of the steam through a perforated nozzle plunged into the bucket. As in the case of gas supply, the Steam Supply Company lay their pipes up to the houses, the consumer paying for all internal pipes, fittings, and radiators. In a moderately-sized eight-roomed house the expenses of these amounted to \$150, or a trifle over 30*l.*, and in larger houses, with more expensive fittings, to \$500, or 10*l.* or 10*7*/₁₀.

The operations of the Heating Company have been up to the present time of an experimental character, and from the 200 houses already supplied with the heating connection the actual cost of the coal that would have been used for heating has been provisionally received in payment, and the amount has left a wide margin over the working expenses, though the company's operations at present cover but a small portion of the area for which they have provided plant. The working expenses consist of but little more than the coal and the wages of two firemen, and the central plant appears very small, both in coal and bulk for the results obtained. The capital of the company consists of \$50,000, in 500 \$100 shares, which has covered the cost of the central plant and the three miles of steam-pipes laid through the city. The scheme on all hands is acknowledged as a great success, and from enquiries of those who have the steam heating in use, I am satisfied that the system of a central steam supply is destined to become the future means of heating towns.

EXPERIMENTS WITH DYNAMITE.

A series of experiments with dynamite were made last week in Messrs. Mitchell and Co.'s quarries at Portland, in the top and bottom "cap stone," overlying the celebrated Portland stone. Two sections of rock were operated on simultaneously—a section of cap stone next the Portland bed, into which were bored the holes in line 9 ft. apart, and each 3 ft. deep, well planned to cut to and work to each other. The other part operated on was a section of top cap overlying the bottom cap stone, but a step back and into which four bore-holes had been made 3 ft. deep each and 9 ft. apart in line with each other. The seven holes in the two sections were charged with 10 lbs. of dynamite, and electric fuses inserted, coupled up together in circuit by small copper connecting wire, insulated with gutta-percha. The holes were then filled up with water in lieu of stamping or steaming, and the end wires connected to the two cables leading to the electric-machine, a safe distance away. The quarry was then cleared of men, and the signal "all clear" having been given, the electric-machine was unlocked, the cables attached to the terminals, and by turning the handle of the machine a few revolutions a current of high tension electricity was dispatched along the cables through the fuses, exploding the seven charges simultaneously. On examination it was found that the three charges in the bottom cap stone had removed a section of rock 42 ft. 6 in. long by 7 ft. 6 in. wide, by 5 ft. deep to the bed below—equal to 59 cubic yards, equal to 132 tons 15 cwt.

The four charges in the top can had removed a section of rock 42 ft. long by 5 ft. 3 in. wide, by 7 ft. deep to bed of lower capstone—equal to 57 cubic yards—equal to 123 tons 10 cwt. The rock was broken up into blocks from 5 to 15 tons each so effectually that the whole lot operated upon—261 tons 5 cwt.—was removed clean away by the quarrymen in two or three days; and on Saturday another lot was operated on in equally as effectual a manner as the former—a section of solid rock—capstone, 49 ft. long by 7 ft. wide by 5 ft. deep, into which four bore-holes were made, 3 ft. deep each, in line about 9 ft. apart, loaded with 6 lbs. of dynamite, and electric fuses inserted and exploded in the same manner as the previous one. This explosion operated most efficaciously, removing the whole lot operated on in a perfect manner, the rock having been cut in a clean straight line from bore-hole to bore-hole. The amount removed was 63 cubic yards, or 141 tons. A host of quarrymen and others witnessed the experiments, and were astonished at the vast amount of rock removed with such a small amount of explosive material used, and so few and shallow bore-holes. The experiments were conducted under the superintendence of Mr. Read, the local dynamite agent, by Mr. John Harris, travelling instructor to Nobel's Explosive Company, Glasgow.

The advantages of simultaneous blasting are apparent, such as a series of holes well planned to work to each other, requires a less amount of explosive material, the resistance being far less than when shots are fired singly, as it then has to tear out and break off the rock independently for each shot, whereas a lot of holes well placed and exploded simultaneously brings the whole lot operated on away at once. Again, by electrical blasting there is no danger of hanging fire, which is always a source of danger with time fuses, to say nothing of the time lost in waiting for shots to go off with long lengths of fuses burning. The charge-man always carries in his pocket the key of the electric machine, so that he is never in danger of having the circuit completed and consequently a premature explosion; and after he has discharged a current of electricity and detached the cables from the machine it is utterly impossible for there to be any hanging fire. The electric fuses employed were Brain's high tension fuses—very handy for miners, quarrymen, and many others, they being made up in a small strong block of wood especially designed for rough handling and fixing to dynamite cartridges, but electrically very sensitive, a number of them being readily exploded by a L-claw-like battery of two cells. The electric machine used is an American invention—a high tension frictional machine consisting of an ebonite disc revolving between two rubbers of amalgam—bisulphide of tin. The condenser is in the bottom of the ebonite box of the machine, and consists of two sets of plates of tin foil interlaid alternately with ebonite, and when charged the one set of plates is at a higher and the other set at a lower potential than the earth. It is perfectly insulated from damp by a wide, thick, india rubber band stretched tightly round the joint of the ebonite box containing the disc and plates. It will give a spark 2 in. long, and is competent to explode several hundred charges simultaneously.

A short time since a firm of salvage contractors from Donegadha removed the wreck of the Old Harry by order of the Belfast Harbour Commissioners. This vessel was sunk last year on the Carrickfergus Bank; the wreck was removed by the aid of dynamite in the following manner:—The dynamite was stuffed into canvas hose, 3 in. in diameter and from 20 to 50 ft. long, thus making a dynamite cable. These were placed along the water-ways on each side of the decks, and when exploded cut away the decks and beams, and then charges of about 20 lbs. each were placed against the stern-post and exploded, bursting open the vessel at the ends. The finishing touch was to place a long dynamite cable underneath each bilge outside, and when exploded it cut through the sheeting and ribs, completely breaking up the vessel into portable pieces. The charges were all placed by a competent diver, and fired either by electricity or gutta percha waterproof fuse as desired, but preference is usually given to electric fusing, as its action is instantaneous, and no time lost in waiting for the burning of long fuses. The salvage contractors of Donegadha always use dynamite for cutting and breaking up wrecks in preference to all other explosives.

Amongst other novelties of the age dynamite is being used for killing worn-out horses, and also for killing cattle; experiments were successfully carried out before the Humane Society in Birmingham for dispatching worn-out horses, and also at Dudley. The horses were drawn up in line, and about $\frac{1}{2}$ oz. of dynamite with electric fuse attached was fixed on the forehead of each horse, and connected together with insulated copper wire in circuit with the machine, the operator standing about 5 yards off. Immediately the electric current was sent through the fuses the charges exploded simultaneously, the horses falling down dead without a struggle, the charge knocking a hole through the forehead to the brain. Experi-

ments have also been carried out in London, killing cattle for the meat market with dynamite.

We understand the Government, after satisfying themselves as to the safety, &c., have granted the Dynamite Company of Glasgow a license to manufacture and sell a new explosive called "blasting gelatine," consisting of 93 per cent. of nitroglycerine and 7 per cent. of collodion cotton. It is said to be the most formidable explosive known, and likely to put all other violent fulminating compounds in the shade. In appearance it is very much like a light coloured jelly, and is insoluble in water, and is reputed to be safer in transit, storage, and handling than the well-known dynamite, and 25 per cent. stronger than the latter. Salvage contractors, mining agents, railway, dock, and harbour contractors, quarry owners, miners, and others are waking up to the fact that commercially these explosives are doing them a power of good, consequently they are coming rapidly into general use.

STEAM CONVERTED INTO GAS.

When we published an article under the above heading, a short time ago, we mentioned that Mr. Stephan, who had discovered a process of converting steam into a burnable and luminous gas, did not feel at liberty to disclose his *modus operandi*, the patent arrangements not then being completed. Patents having now been secured "all over the world," as Mr. Stephan informs us, he feels himself at liberty to divulge particulars of the process to perfecting which he has devoted so much of his time. That he should seek world-wide protection, by patent, for his discovery will surprise nobody when its importance is realised. His explanation shows that it is even more important than we told the public to anticipate. Mr. Stephan not only, apparently, solves the gas question, which has troubled our Corporation for some years, but he also disposes of the sewage difficulty, which has engaged the attention of so many scientific minds, and been the cause of heavy "drains" on the rate-payers' pockets. Under Mr. Stephan's process all sewage matter is to be easily disposed of, gas produced "free, gratis, for nothing," and yet an immense profit be made. He at first estimated the profit at 150 per cent., and this estimate he still clings to as correct. The only question is whether, taking all the advantages promised into consideration, 150 per cent. is really not below the mark!

The process is as follows:—A boiler, to contain water or sewage, as the case may be, is placed over a retort, underneath which is a fire-hole, the flues of this ramifying round both retort and boiler, and the heat passing through these flues causes both boiler and retort to be heated simultaneously. In the case of making gas from sewage or any animal refuse, solids and liquids are put into the boiler, and the liquid parts, being evaporated by heat, are passed, in the form of steam, through a pipe into the back end of the retort, where are placed a number of perforated iron discs. These are perforated in various ways, in order that the passage of the steam through them shall not be direct, but be impeded as much as possible, the result being that by the time the steam has passed through the whole set of discs it issues as hydrogen gas, the oxygen having been deposited on the iron in the form of magnetic oxide. Hydrogen would of course, on ignition, give off a flame of a pale blue colour, which would not be luminous. The gas is then passed through layers of limestone packed closely in the retort, and in its progress becomes saturated with carbonic acid. At this stage the light burns with a reddish tint. The residue, or solid matter of the sewage is then brought into use. Having been allowed to subside in the boiler, it is found to be in the form of a dry, black, inodorous hydro-carbon, and in this state it is taken from the boiler and placed in the front part of the retort, next to the limestone already referred to. The application of heat causes an abundance of carbon to be given off, which, being absorbed by the lighted carburetted hydrogen (which the gas has become by passing through the limestone), it becomes highly luminous, incandescent, and permanent. The residuals from the retort are soda ash, lime for building purposes, cement, &c., and from the condenser an abundant supply of ammoniacal liquor, tar, pitch, and lubricating grease. All the above are of course derivable from the sewage and limestone, and some of these products would be extremely valuable for enriching the soil. Thus the sewage could, as so many people argue that it ought to, return to the land in the form of a fertiliser.

The above process, as will be seen, is applicable more particularly to towns. In carrying it out in practice it will be evident that it would be most convenient to have the gasworks erected near the sewage outfall; thus the sewage could gravitate into the works, without the necessity of pumping, and the gas being manufactured at a low level would readily rise through the mains to almost any height. Mr. Stephan assures us that, with proper appliances, no unpleasant smell would attend the manufacture. No fuel would be required for heating the boilers and retorts; such an enormous quantity of gas would be produced by the consumption of (say) the sewage of Worcester that there would be far more than would be necessary for the lighting of the whole town, and for supplying heat to the boilers.

In case of manufacturing the gas from water as, for instance, on steamships, the process would be the same (as regards the hydrogen) as with liquid sewage; but for producing luminosity bones would then be available for making phosphorous, china, &c.

Mr. Stephan has made formal application to the Birmingham Corporation Gas Committee, for leave to experiment at a portion of the Gasworks there, with sewage, and we hear that the application is likely shortly to be acceded to.

—*Worcestershire Chronicle.*

URE'S DICTIONARY OF MANUFACTURES.

Although for many years past "Ure's Dictionary of Arts, Manufactures, and Mines" has been justly acknowledged as a standard work of reference for the subjects of which it treats, it must be admitted that it had become rather antiquated, more from the rapid progress which has been made in science and in industry within the last few years than from the length of time that has elapsed since the last edition of the work was issued. The defect has, however, now been removed by the issue of an exhaustive Supplement,* forming the fourth volume, of 1020 pages. Turning to articles likely to be of special interest to the readers of the *Mining Journal*, it may be mentioned that there is an excellent article on "Arsenic," so far as regards its manufacture from the waste of an iron colour works, and it may be hoped the process will be generally carried out, not merely for the value of the arsenic recovered, but from the fact that it must tend to prevent the transportation of arsenic to places where its presence is certainly not desirable. In some cases brief references are given, directing to places where full particulars of the subject named may be found. Thus, under "Atmospheric Pressure" for raising coal, it is stated that a paper translated from the French by Mr. Theo. Wood Bunting was published in the Transactions of the North of England Institute of Mining and Mechanical Engineers, December, 1875, and similar references are given in various other places where the matter is not of sufficient importance to justify the insertion of an article upon it.

There is an excellent article on the new metal Gallium, describing its discovery by Mr. Lecoq de Boisbaudran, and on the method of extracting it. It appears that in August, 1875, when the discoverer was making a spectroscopic examination of a blende ore from the mine of Pierrefitte, in the valley of Argelès in the Pyrenees, he discovered two peculiar bands both in the violet ray, which were sufficiently defined to indicate the existence of a new metal. In December, 1875, Wurtz exhibited before the Academy of Sciences a specimen of the metal which Lecoq had produced. The gallium is a bright white metal, superior to platinum in colour, and its various salts have since been examined. "Toughened Glass" is, of course, fully referred to, and there are excellent articles on Gold, Gold Alloys, Gold Amalgamation, Gold in Mine Waters, &c. There are

* "Ure's Dictionary of Arts, Manufactures, and Mines," containing a Clear Exposition of their Principles and Practices." By ROBERT HUNT, F.R.S., Keeper of Mining Records. Vol. IV. Supplement. London: Longmans.

long papers on Iron Ores, Iron and Steel, Lignite, Manganese, and Mineral Oils, and a very interesting one on Nickel. The Dressing of Ores is very fully treated of, and there is an article on Rock-Boring by Mr. Darlington, which would, however, have been enhanced in value had not all but the writer's own invention and arrangements been virtually ignored; the treatment, however, is excusable, as an inventor cannot be expected to give prominence to the machinery of rivals. The Cranston, Ingersoll, and numerous other drills constantly noticed in the *Mining Journal*, which at the present time have almost the monopoly of the market, are not mentioned. There are articles on Silk, Silver, the Utilisation of Blast-Furnace Slag. The Telephone is described, but the Phonograph is merely mentioned incidentally; yet, upon the whole, a large amount of valuable information has been brought together, which, with the previous volumes, will render the work very complete.

LEAD MINING IN DERBYSHIRE.

Many changes have taken place in lead mining in Derbyshire during the last decade, so that the returns of one year contrast in a most marked manner with those which either preceded or followed it. Water has been a serious drawback to operations in nearly every district, whilst the peculiar laws relating to the opening of the ground in prospecting for lead ore from their simplicity and the encouragement they give to men without capital to enter upon another's property without leave or licence has not had the effect that might have been expected. Sinkings have been made, but only to be abandoned, owing to a want of capital to go down to certain depths, or from an influx of water, for which there was no machinery to carry off. Lessees and those holding under them, unlike some other lead mining counties, have not extolled the value of certain properties by means of reports and highly-coloured prospectuses, and the consequence has been that capital has not been invested in the lead mines of Derbyshire to anything like the extent that might have been expected. This is all the more surprising, seeing that ore can be sought for in nearly all places without let or hindrance, for we are told by the "Mineral Articles" that it is lawful "for all the subjects in this realm to search for, sink, and dig mines or veins of lead ore, upon, in, or under all manner of lands of whose inheritance soever they may be (churches, churchyards, places for public worship, dwelling-houses, burial grounds, orchards, gardens, pleasure grounds, and highways excepted)." To most people such a law would be considered as carrying a privilege a long way too far, seeing that it directly interferes with the rights of private property, and so carries out the principle of the liberty of the subject on one side only. But even such a free-and-easy system does not appear to have worked at all well, and in all probability has been most injurious to many men who without capital have "tried their luck" in digging on other people's land only to be disappointed at the results. Of this we had ample evidence during a visit we recently paid to the lead districts of Derbyshire. In the midst of the most charming scenery we saw many places where the ground had been broken, lead found, but not in sufficient quantities to pay, and then abandoned. This has been fully borne out by the yearly returns made, for we find that in 1875 there were 28 mines in the county that produced during the year less than 1 ton of ore; 53 yielded above 1 ton; and only five gave above 100 tons of ore. During the last and the present year, however, matters have been looking better, but only at a few places, where there is plenty of machinery and the owners are capitalists. Most of the small concerns have been closed, and the few that are being worked are anything but profitable, whilst one mine alone now raises more ore than all the others put together. But there is very little doubt but what there are large reserves of ore that would well repay capitalists for opening out, even with the present low price of ore.

Derbyshire is, undoubtedly, the oldest lead mining county in the kingdom, for the ore was worked in the old Roman town of Wirksworth, in the time of HADRIAN, and after him by the Saxons, and in the Moot Hall is still preserved the "Miners' Standard Dish" presented by HENRY VIII. The QUEEN, in right of her Duchy of Lancaster, is seized of and in the manor and wapentake of Wirksworth, and of the lead mines in what is termed the King's Field; and, by the Act of 1852, PETER ARKWRIGHT, Esq., was appointed lessee of the lead duties, whilst the Duke of DEVONSHIRE, Duke of BUCKINGHAM, Duke of RUTLAND, the Earl of THANET, Lord SCARSDALE, and others are entitled to the mineral duties in certain manors or liberties, of which they are tenants for life. These duties cannot be very large, we should say, seeing that so few mines are being worked, whilst the lessees do not care to become mineowners themselves. Were they to do so probably Derbyshire would hold a higher position than it does at present as a lead-producing county, for mining operations cannot be successfully carried out excepting by those who have plenty of capital to provide the best machinery and appliances for pumping and other purposes. Hence it is that lead mining in the county is in such a few hands, whilst we believe there is only one gentleman who is actually doing a good and healthy business—and that is Mr. WASS, the owner of the Millclose and several other mines.

The Millclose Mine is the finest in Derbyshire, is situated about a mile from Darley, and four from Matlock Bath. The mine was closed for some time, owing to the great quantity of water; but Mr. WASS put down some very powerful machinery and plant, at a cost of something approaching 20,000*l*, and work was resumed some eight or nine months ago. There are several engines on the bank—one of them being an 80-in. cylinder, 10-ft. stroke, with 35-ton beam, by HARVEY and Co., Hayle, Cornwall. The motive-power is obtained by means of four double-flued boilers, by GALLOWAY and SONS, of Manchester, and one single-flued boiler; the lifts being capable of drawing out more than 2000 gallons of water per minute. There is another engine—a 50-in. cylinder—besides two for drawing purposes, and a capstan engine. The shafts are of a moderate size and depth, whilst there are the usual dressing appliances, stores, &c. The mine is by far the finest in Derbyshire, and the output is now at the rate of upwards of 200 tons per month, being considerably more than is raised at all the other mines in the county. The ore is of excellent quality, giving from 75 to 80 per cent. of lead. After washing and dressing the ore is taken direct to the Lea Lead-works, near Matlock, Bath, where it is smelted by Mr. WASS, who thus has the whole of the work in his own hands. The area of mineralised ground in connection with the mine is large, so that there are very extensive and rich reserves to be worked. The ore, it may be said, is very easily worked by comparatively few hands, for several veins appear to meet together, so that large bunches are taken out without difficulty. Whilst visiting the mine we met with Mr. WASS, who most courteously showed us over the place, and also gave us his views as to the future of lead mining in the county. His own mines, we may say, have all the necessary machinery that can be required, and it is to this fact, we believe, that his success may be attributed. Without capital mining in Derbyshire cannot be pursued to a successful issue, and this has been realised to the full extent by a large number of persons who have tried what could be done with small means, and, in some instances, with no means at all.

In most other districts the business doing is very moderate indeed, and several places have been stopped, owing to being troubled with too much water. At Crich the Wakebridge Mine, belonging to Mr. WASS, has been doing tolerably well, and raising, we believe, about 70 tons of ore a month, which has a healthy appearance. In the neighbourhood of Winster, one of the oldest market towns in the county, there are several lead mines; but for some time past very little has been doing at them, although some good ore has been raised at Elton Cross, Heyspots, and Pitts. Eyam has long been noted for its mines and their peculiar situation, and there is at least one company that we were given to understand still works the ore, although not at present to the profit of the shareholders, although last year the Eyam Mine raised lead to the value of 240*l*. The Milldam Mining Company, at Great Hucklow, are raising lead, but the quantity is scarcely sufficient, we should say, at present at least, to pay a dividend. Like many other mines, the well-known Magpie has been suffering from a surfeit of water—a complaint that has been fatal to a good many similar works; but we were informed that they are now driving an adit and put

ting down a 70-in. cylinder engine, so as to get clear of their enemy, and resume working operations. No doubt, as we have before stated, there are other good mines that have been abandoned because the parties working them were unable to find the capital to pay for the necessary pumping and drawing machinery, and it is to some of these that attention should be directed by capitalists who desire to invest in the lead mines of Derbyshire. In the Bradwell, Cromford, Middleton, &c., and Bonsall and other districts some mines are at work, but they are not doing much, and, judging from appearances and what they are doing, it is rather difficult to say how they are made to pay even ordinary expenses.

A walk of about three miles from Matlock Bath, and up a steep hill, brings one close to the town of Wirksworth, and standing on the summit the remains of many lead mines can be seen that at one time were full of life and activity, bringing to the surface large quantities of rich ore. Some of the names, however, are significant enough as to the doubts of those who started them—for we have Milner's Venture, Mould's Venture, the Gall Mining Company, Defiance, Chance, &c. These appear to have all passed into oblivion, and even the Grey Mare Mine has turned out a bad horse for its backers. One, or perhaps the best mine in the district, was the Bage, belonging to the Messrs. WASS, only a short distance from the town, and from it, in 1872, lead to the value of upwards of 4000*l*. was extracted, but now we believe it is standing. We were, however, informed by Mr. WASS that he was engaged in making some searches under the town itself, and if these were successful then operations in all probability would be resumed; but, on the other hand, if the results were contrary, then most likely the district would be entirely deserted so far as lead mining was concerned.

In conclusion, we may say that there are various reasons for the depression which has so long existed in connection with lead mining in Derbyshire, not the least of these being the vast bodies of water that have to be overcome, and the limited capital at the command of those who have opened out mines. Success, as in the case we have alluded to at the Millclose, is only to be obtained by those who are in a position to put down sufficient engine-power and machinery to overcome water and everything else, so that true economy in working and the making of profit in the carrying on of lead mines simply means plenty of cash at command. With such we have no doubt but what there are plenty of abandoned mines in Derbyshire that could be made to pay well.

GOVERNMENT INSPECTION OF MINES.

MR. ALEXANDER'S REPORT.

The year now gone has not been marked by any unusual disaster, and the depressed state of trade has marred the expansion of mining enterprise throughout the coal field generally. From a commercial point of view, the mining industry of the country cannot be said to be in a flourishing condition, and the prices, unless in favoured localities, do not bear leave large margin of profit for the producer. The use of coal, now the great alient of industry, is constantly extending, and notwithstanding the backward state of trade the mining produce of the district as compared with 1875 has been but slightly affected. Notwithstanding the general anxiety to diminish the casualties incidental to those who work in and about mines, the success has not yet been so great as could be desired. To carry out such work without accidents is apparently impossible, to mitigate, or reach a standard attained by the most advanced and best managed district, is all that the most sanguine can expect to realise.

One of the casualties referred to by Mr. Alexander is an externally-fired cylindrical boiler explosion at Cowie Colliery, near Stirling, and with regard to this Mr. McColl, engineer, of Glasgow, who was directed by the Procurator Fiscal to report upon it, suggests, after giving the details, that "the loss of life and property through the explosion of this class of boiler may be greatly reduced by tying the two ends of the boiler together by means of a strong longitudinal stay running through the boiler from one end to the other and firmly secured. While this would probably have little effect in preventing the explosion itself it would, by preventing the two ends of the boiler from flying apart, greatly reduce the possible amount of damage."

It would perhaps be difficult to define in how far Government interference is tended to better the condition of those who work in mines. It is manifest, however, that notwithstanding the increased dangers to which all are exposed, from operations becoming more complicated and extensive, that the average loss of life has been reduced. If it could be equally satisfactorily proved that owing to the improved condition of the mine men are now capable of continuing their labour to a more advanced age, something definite could be pointed to as having been accomplished. Statistics, when carefully compared, will, he is persuaded, clearly prove that this is so, and that the average age to which underground workmen are capable of continuing their labour has gradually lengthened since the passing of the first Mines Regulation Act.

MR. MOORE'S REPORT.

During the past year the mining industry has been in a most depressed state, and fewer coals were sold than in 1876. Many of the new collieries which were projected during the period when high prices prevailed in 1871-2 have now been sunk, and are turning out large quantities of coal notwithstanding this dull trade. The result is that many of the older collieries have had to give way, and prices, in the competition for trade, have been reduced to the lowest point. Miners' wages were reduced in some instances, but not to any great extent. The nominal wage in the sale collieries of Lanarkshire was from 4*l*. 6*s*. to 5*l*. per day. He is enabled to give the rates paid per ton during the year for the same amount of work, and this will give a fair idea of the state of matters. In the counties of Fife and Clackmannan, where the output is about one-sixth of the whole district, there was a strike and lock-out which lasted 15 weeks, and the output was only 1,566,124 tons in 1877, against 2,022,635 tons in 1876. There were no other strikes.

Mining operations, especially in Lanarkshire, are assuming such proportions that only the best management and discipline will enable them to be carried on with safety. It is much to be regretted that the miners so seldom assist the owners in securing the safety of the mine, as far as that can be done by examinations in terms of the 30th general rule. One excuse is the expense, but he would recommend its being done even if the masters had to bear it. It must be kept in mind, however, that a miner's examination such as is meant by the 30th general rule can only refer to facts or to opinions such as are to be expected from a workman, and that any scientific opinion as to the value of the mode of ventilation and working pursued by the manager must not be expected. In matters of this kind their opinion is of no value, and the owner, agent, and manager must rely on their own judgment and observation. He thinks periodical examinations—say, monthly or quarterly, and independent of the manager's supervision—by skilled persons at least of the grade of a certified manager, would be attended with benefit; and he feels certain that for a small sum yearly a regular examination could be made which would be beneficial to both point of safety and economy.

MR. WARDELL'S REPORT.

Whilst thankful that the loss of life from explosion forms so inconsiderable a part of this year's total, still there remain the same cautions, advice, and warnings to be impressed upon all for guidance in the future, and the same lessons to be drawn from what has happened in the past. All these must be borne in mind, and the recommendations repeated, even at the risk of tedious reiteration, in order to endeavour, so far as possible, to reduce the rate of mortality to one even still lower in years to come. When it is considered how large an area this district consists, and that it embraces within it some of the most fiery mines in the kingdom, mines, too, many of them of vast extent, with many miles of old workings, and in which eruptions of gas, at a pressure which it is hardly within our intelligence to comprehend, from time to time occur, the number of deaths from this source of danger is certainly to be regarded as favourable, and progress is surely here appreciable. That explosions, when they do occur in the Barnsley and Silkestone seams, are sometimes of such gravity as to cause a large amount of dust collected, and when an explosion of gas takes place it scatters and ignites this dust all over the pit, making a two-fold disaster, as it were, and causing as much or, perhaps, more injury by the whirlwind of red hot dust as by the actual firing of the gas itself, and thus being sometimes drawn and attracted over a large portion of the workings, affecting an area which might otherwise have been localised by the actual amount of the gas. Then again, where very large goaves exist, with imperfectly ventilated cavities in the roof, gas, from its lightness, accumulates there, and these places form a kind of train of reservoirs, and are all gathered into an explosion such as he has described.

The educational requirements of the Act have been observed in the past year; for he has no case to mention where the clauses specifying the age at which boys are to be employed were infringed. This is satisfactory when the number of mines where young boys are employed in this district is taken into consideration. Under certain clauses of the Act boys under the age of 12 receive an exemption from the Secretary of State, at his discretion, according to circumstances, which enables them to be employed underground. This is of material importance in parts of this district where the seams worked are so thin that otherwise it seems probable they would have to be abandoned altogether. Still he is glad to perceive that so far the number of these gradually diminishes; 374 boys of this age were employed last year, as compared with 398 the previous year, or a reduction of 24. In 1875 the number was 837; in 1874, 615; and in 1875, 470. There are, therefore, at the present time 463 few boys of this age employed underground than there were five years ago. There were in 1876 5 females between the ages of 10 and 15 employed above-ground, 6 between 10 and 16, and 15 above 16, or 24 altogether. In the year under report there are none between 10 and 15, 2 between 13 and 16, and 14 above 16, or a total of 16. The total number of persons under the age of 16 employed at the mines in Yorkshire and Lincolnshire above and below ground finds to be 8966 out of a gross total of 60,777 persons employed, or nearly one-seventh; and referring to the list of deaths, the proportion killed, aged 16 and under, is 12 out of a total of 107, or about one-ninth. The number of collieries in

this district is less by six than in 1876; yet though the number of persons is also reduced, the output of mineral is considerably increased. The fact that the number of collieries has decreased does not signify that there have no new undertakings been commenced; there have been several, and many at the present time are in process of being opened out, but a large number of small collieries have been closed, more than counterbalancing any increase which would otherwise have been apparent.

MR. WILLIS'S REPORT.

Referring to an explosion at Allhallow Colliery, Cumberland, Mr. Willis reports that on the morning of the accident one witness admitted having seen gas and "batted" it away; this was at the top end of the working face. There was a conflict of evidence as to how, if ever, this had been reported to any superior official. Ten minutes before the explosion the manager himself had been along the "face," and he said he did not see any signs of gas, but he cannot help thinking, however careful his examination had been in other respects, it was not efficient in this. At this time three shots were close upon yards on each side of the first shot, which was at the dip end of the face, and they hit it. This shot caused the explosion. It was very wrong to allow the ventilation of a district such as this to depend upon brattishing. He has no doubt gas come to be given off in greater quantity than could be sufficiently diluted by the feeble current of air which must have prevailed. The examination before firing the shot, if made at all, was not sufficiently extended, especially as it was known that gas at the high end of the face had to be "batted" out on that morning. There was an absence of instructions and regulations as to whom and by whom and how accumulations of gas when discovered had to be reported, each other apparently working by himself, and if he found gas and could get it removed, leaving the matter resting there.

Two frightful (in their results) explosions of dynamite are recorded; in one case two men lost their lives, and in the other one. As might have been expected, and as is usual in such cases, not a trace of anything except the shattered fragments of the poor fellows' bodies was left to throw any light on the causes of the accident. In his inquiries relative to these two accidents, and in his general inquiries as to the use of dynamite, he found a bad practice prevailing—the supply of dynamite and the detonating caps used with it were generally kept in the same box provided for the purpose. Separate boxes are now used, and, it is expected, as kept at a good distance apart. It also came to his knowledge that in using dynamite in wet ground it was not an unusual practice for the men to draw the end of the fuse through the tail of their candles whilst the candle was alight, before inserting it into the detonating cap. This was to prevent any possible wetting of the end of the fuse. The proper method of doing this is, after the fuse has been inserted in the cap, to carefully nip it all round with pliers provided for the purpose. The tailoring process is perhaps harder for the workman, but in performing it there is a possibility of the fuse becoming ignited and throwing off sparks, and these in coming in contact with the caps (in the box for instance) would be sufficient to account for the explosion of the dynamite. He is strongly of opinion that this was the explanation of the accident at Ehen Mine. He is strongly of opinion that it is right to say this is only conjecture; there was no evidence to this effect.

IMPROVEMENTS IN PUMPS.

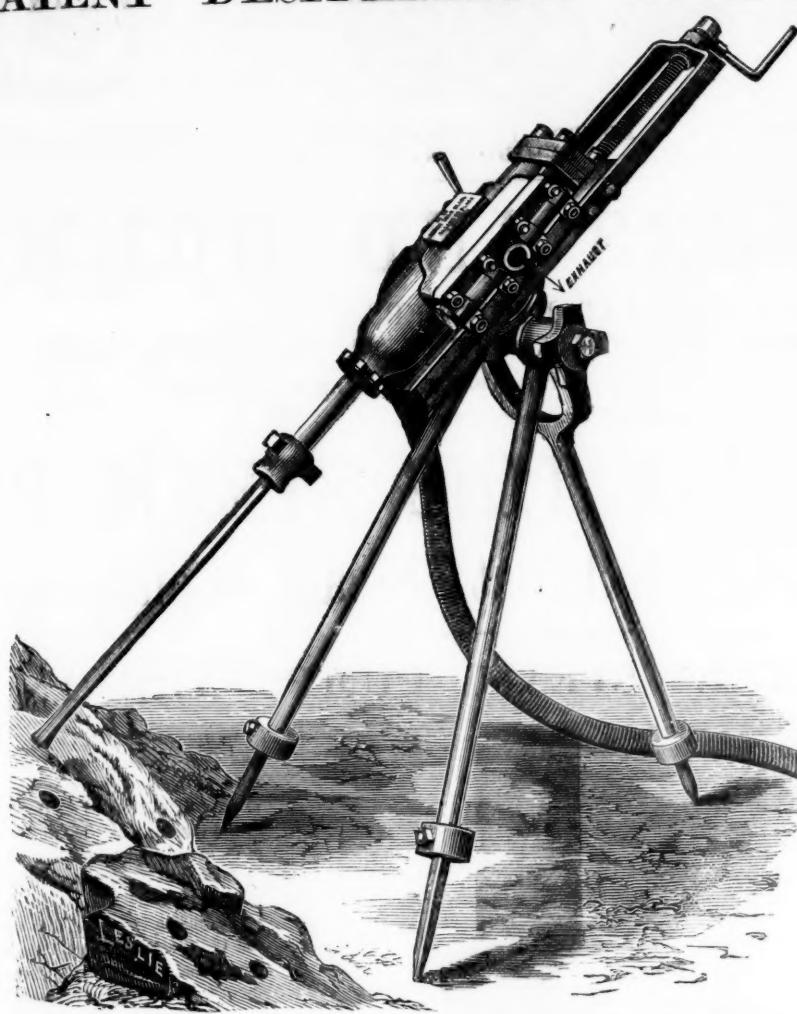
The economic raising of water being of great importance in connection with a large number of industrial operations, inventors have constantly turned their attention to the subject, and among the more recent inventions is that of MR. GEORGE PINNINGTON, of Chester, which consists essentially in using in place of the piston, plunger, or bucket at present in use a coil or coils of flexible tubing, the said coil or coils of flexible tubing being alternately coiled and uncoiled on and off a drum barrel or the like, fixed within a closed pump head or its equivalent. The construction of a single-action pump may be described by way of example. To a tube or shaft provided with a valve opening upwards he attaches an air-tight head or box, within which is a drum or barrel caused to revolve by means of a shaft or its equivalent passing through the pump head or box. Around the said drum or barrel is coiled a length of flexible tubing, one end of which, fitted with metal or other rigid tubular end, passes out through a stuffing-box in a line with the longitudinal axis of the drum or barrel, so that such end shall rotate with the drum or barrel. The other end of the tube passes through a second stuffing-box placed at, or nearly at, right angles to the longitudinal axis of the said drum or barrel, and is free to slide through the said stuffing-box. Instead of employing a stuffing-box, a head of water may be kept over the opening through which the tail passes, and so form a water packing. Both ends of the tube are open to the atmosphere. Coils of wire or like means are employed to keep the flexible tubing distended. The head or box is fitted with an outlet provided with a valve.

From this description it will be evident that when the flexible tube is caused to uncoil from off the drum or barrel a vacuum will be formed within the head or box, and liquid will ascend through the pipe or shaft past the valve into the head, and will fill the space before occupied by the flexible tube. When the tube is again coiled on the drum or barrel the liquid will be forced out past the outlet valve. In constructing a double-action pump according to this invention, two heads or boxes are employed, and the flexible tube is so coiled on the drum or barrel in each head or box that when motion is given to the said drums or barrels one tube is being coiled, whilst the other is being uncoiled. The two ends, which pass out of the heads or boxes in a line with the axis of the drums or barrels, may be connected together when they are in the same straight line, as also may be the drum shafts. To ensure that that portion of the flexible tube which enters and leaves the head or box during coiling and uncoiling shall lay properly on the drum or barrel, or occupy the desired position, so as freely to pass through the stuffing box or gland, a longitudinal motion is given to the drum or barrel during its revolution, or a sliding motion is given to the stuffing box or gland through which the flexible tube passes. Further means for causing the flexible tube to take the necessary position on the drum or barrel consists of an endless band or bands of canvas or other material placed at the required distance from the drum or barrel, and is caused to travel by contact with the flexible tubing during coiling and uncoiling.

SLAG WOOL.—Although slag wool is a non-conductor of heat, sound, and electricity, and also incombustible, it has not yet been used for many technical purposes on account of its giving rise to the emission of free sulphur, ether, and hydrogen, and filling the air with fine penetrating dust. The invention recently patented by MR. CHARLES BAATZ, of Newcastle-street, does away with these objections, and slag wool prepared according to his invention will neither dust nor emit sulphurated hydrogen, even when brought into contact with acids. In preparing slag wool according to his invention, he first forms it into pads or bricks, according to the use the slag wool is destined for. For this purpose he uses perforated metal, or wood. After evenly filling the moulds he dips them in diluted alkaline silicate of about 1*l* 0*s*. to 1*l* 1*s*. The moulds are then emptied and again filled, and the bricks or pads so formed are exposed to the air for about a week, by which time they will become hard on the surfaces, or this hardening may be effected more expeditiously by drying the pads or bricks in hot air, which may or may not be mixed with carbonic acid. For certain purposes the moulds may be dispensed with, and the slag wool, where its surfaces are exposed to the air, may be painted over with the alkaline silicate. The invention is useful for many purposes; the slag wool so prepared can be used not only for lagging boilers, covering steam pipes and hot and cold water pipes, but also in dwelling-houses for stuffing floors and partitions to make them fire and sound proof. For these purposes it is the more specially adapted, as no vermin can live in it. When covering floors or roofs with slag wool, instead of employing bricks, he first lines or covers the floor or roof with cloth or paper well saturated with the liquid, and then applies the slag wool in its natural condition over this cloth or paper, and covers it with a similar coating of cloth or paper prepared as described. For covering steam boilers, steam pipes, hot and cold water pipes, and similar articles, he applies the raw slag wool direct on the surface to be covered, and then covers the surface of the coating of slag wool with cloth or paper saturated as described, over which may then be applied plaster or paint.

NEW EXPLOSIVE.—Nobel has invented an explosive which is still stronger than dynamite. From its resemblance to calf's foot jelly he calls it jelly powder. It is one great defect of dynamite that when it is damp the nitro-glycerine separates from the absorbing earth. The jelly powder, which consists of 94 or 95 per cent. of nitro-glycerine and 5 or 6 per cent. collodion cotton, is so mixed as to assume a gelatinous form, which is tough, but can be easily cut with knives or shears, and applied to crutches or balls. It is water-proof, acts in the same way as dynamite, but is at least 50 per cent. stronger.—*Forbes, der Zeit.*

THE PATENT "DESIDERATUM" ROCK DRILL.



THE PATENT "DESIDERATUM" ROCK DRILL.

As rock-drilling machinery is now becoming so generally used in mining operations it is satisfactory to see that engineers, who give their attention to this class of machinery, are simplifying and improving it. Messrs. LE GROS, SHAW, CLARK, and CO., consulting and mining engineers, of 4, Queen-street place, London, and 13, Clare-street, Bristol, who have had considerable and varied experience in mining operations and railway tunnelling, are the manufacturers of a new and improved rock drill, called the "Desideratum," which has been patented by Mr. P. J. Le Gros of this firm, who was formerly with the "Ingersoll" Rock Drill Company. The "Desideratum" is, therefore, the result of thorough practical experience.

The above engraving is taken from a photograph, and represents the patent "Desideratum" rock drill mounted on a tripod stand, which is intended principally for open work; but for mining operations the machine is usually mounted on a pillar (perhaps more generally known as a stretcher bar), which is fitted with a strong adjusting screw, and which is made fast either from top to bottom or from side to side in small headings and shafts, whilst for large headings and tunnels several machines are mounted on a travelling car, with suitable projecting arms to carry the machines. Messrs. Le Gros, Shaw, Clark, and CO. also make a special shaft sinking frame, on which two or more machines can be fixed for sinking large shafts.

The principal features to be studied in rock drills are economy in first cost and in working, in having a machine which will be equally effective when boring in all classes of rock, and which is simple, compact, and light, so as to be easily moved about, adjusted, and worked by any ordinary miner or quarryman. It will be seen from the above illustration that the "Desideratum" rock drill is exceedingly light and compact, and at the same time strong and simple, being free from a multiplicity of working parts, it is economical in first cost and in working,—advantages which will go far to bring it into general favour. It will drill holes equally well in any position and at any angle in all kinds of rock, and the harder the rock the greater the advantage of the machine. The rotary motion of the tool can, simply by substituting one of the working parts of the machine, be changed into a slotting motion for slate and coal cutting. Several have now been working in various mines and other works for nearly twelve months, and appear to be giving very great satisfaction. With one boring machine worked on a pillar in a heading measuring about 5 feet by 6 feet 6 inches at the New Crick Heath Lead, Copper, and Calamine Mines, on the borders of Montgomery, driving has been done at the rate of eight yards per week in very hard mountain limestone, where the previous rate by hand labour was about one yard per week; but a still greater contrast is shown at the Golden Grove Lead Mines, in Flintshire, where one machine has been driving at the rate of nine yards per week, while the previous work by hand did not amount to one yard per week. These are important facts, and speak well for the machine. In each of these cases the drill is working at about 650 and 700 feet from the boiler, and is driven by one of Messrs. Le Gros, Shaw, Clark, and CO.'s patent "Desideratum" Air Compressors (also a new invention), particulars of which we will give in one of our next Journals.

WIRE TRAMWAYS.—Mr. R. S. FRASER, of Portman-square, has invented a method of conveying loads up hill as well as down hill with ease, safety, and regularity, without injury to the carriage or load conveyed; also ensuring complete control over the traveller at any point of its issue. He generally employs for each line a single wire-ropes fastened at supports at each terminus; the distance between the latter may be even a mile or more. When required two lines may be used at the same time—loaded traveller moving one way whilst an empty one moves the other. The traveller consists of a saddle framing, fitted with wheels riding on a wire-ropes. These wheels may be two, but by preference three or more, in number; their spindles work in some approved grease boxes, such as are used for railway carriage-wheel axles. There is also one or more wheels mounted in the traveller frame below the wire-ropes, so that the latter may ride in the groove of said wheel or wheels, the spindle or spindles of which are also efficiently lubricated (say) by means of a grease axle-box or needle lubricators; the lower wheel is always in action, but is applied for steadyng the traveller in a high wind, which generally causes the wire-ropes to vibrate, thus tending to cause the quickly running "traveller" to jump up and leave the wire-ropes. He covers the traveller when required with a casing (say) of bright sheet copper, and at each end he arranges a plough or fender for pushing aside any branches or other objects that might hinder or obstruct the road. The sides of the traveller framing are below the wire-ropes, connected by a bottom plate hinged to each side; one of the hinge bolts is removable. The load or loads are suspended from hooks or otherwise under the traveller. For transport-

ing loads of great length two or more travellers are connected together. The traveller is by means of suitable winding gear hauled up the ascending wire-ropes, and the return or descending journey is accomplished by gravitation. The ascent is, where it is possible or convenient, arranged for the empty traveller, and the descent for the loaded traveller. The invention is applicable not only on the single traction work principle, but also when gravitation, water, or steam on the endless rope traction principle is available; the winding gear would then be at the lower end station. Where steam is applied as the driving power he prefers to fix a vertical inverted engine to the platform framework above the winding gear. Where intermediate supports are required he provides an upper shunt-wire and lower fender-rail. The invention may, it is claimed, be applied for overhead passenger and goods traffic in streets and roads: the line wire is then supported on suitable brackets or pillars. The tram-car suspended therefrom may be steadied by pulleys on each side of a guide rail fixed against the pillars.

THE COAL TRADE.—According to the official accounts the value of coal, &c., exported in the five months ending May 31 was 2,890,812L, and in the like period of the preceding year 3,024,463L.

CONSUMPTION OF COAL IN MINE ENGINES.—Mr. John Lean, in writing to the West Briton, replying to the letter of "Omicron" (published in the Journal of June 1), says—"In reference to the future of Cornwall let the calm and thoughtful who wish to know about the future ask Mr. T. S. Bolitho or Mr. J. M. Williams; these gentlemen are head and shoulders above all others in their power of gauging the future, and I think they will tell anyone who may be fortunate enough to obtain their opinions that unless economy in mechanical appliances—as in boring—is carried out in all its integrity the future will be one of serious evil to many mines. I do not think that it requires the sagacity of a Bolitho or a Williams to convince everyone connected with Cornish mining that all possible economy is necessary in its prosecution. But why particularise any two individuals as possessing all knowledge? Why should it be thought fortunate to obtain the opinion of Mr. Bolitho or Mr. Williams rather than that of all others? They are two gentlemen of the highest respectability, but their prophetic glance extend farther or penetrate deeper into the dark and hidden recesses of futurity than that of any or all others? I know not; and were 'Omicron' to ask them their reply would be 'No.' Stop the introduction of ore from abroad—I make no allusion to the exhaustion nor to the non-exhaustion of the alluvial tin deposits of the East; they have their source—and it will require no great depth of philosophy to tell what effect it will have on the immediate future of Cornwall. In reverting to the class of men which your correspondent seems to despise—the working engineers—I may tell him, and he should know, that the most eminent and renowned mechanical engineers this country has produced sprang from the lathe, in the fitting-up shop, or factory—men who applied themselves to the use of the hammer, the chisel, and the file. Allusion has already been made to Gwennap, my native parish, but in closing my letter I revert to it. Fifty years ago it was teeming with activity, life, and wealth; its mines, as before stated, and which I will hereunder enumerate, were all rich, and giving, either directly or indirectly, employment to the whole of its inhabitants, and there was no place throughout the parish in which a person could have laid his head on his pillow without being in hearing of the sound or noise of one sort or another from one or more of the mines. In naming the respective mines I will begin at Wheal Gorland (near St. Day), Wheal Jewell, Wheal Unity, Wheal Unity Wood, Treskerby, Wheal Chance, Wheal Rose, North Downs, Poldice, Bissoe Pool, and Wheal Maid, West Wheal Jewell and East Wheal Jewell, Wheal Damsel, West Wheal Damsel, and East Wheal Damsel, Consols (that is, the old Wheal Virgin and Wheal Fortune Consolidated), Cusvey, Cliffwood, Ale and Cakes, and Poldory, together called United Mines, Wheal Squire, Tingtang, Tresavean, Penstruthal, and Wheal Buller. I know not whether I have omitted any, but here you have a list of about 26 mines within the parish, and all rich at one and the same time."

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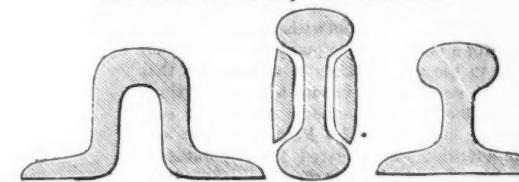
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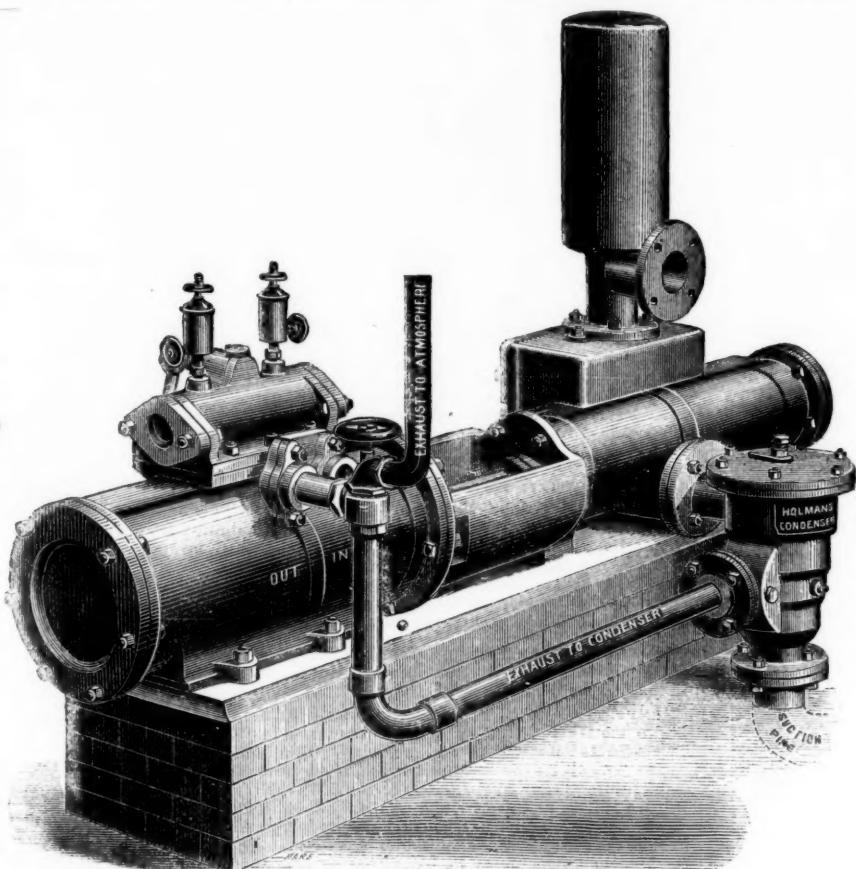
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Length of Stroke	In.	9	9	9	9	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	18	12	12	12	18	24	12	12			
Gallons per hour		680	815	1830	3250	1830	3250	5070	1830	3250	5070	7330	1830	3250	5070	7330	9750	3250	5070	7330	9750	13,000	5070	7330	9750	13,000	16,500	5070	7330		
Price of Special Pump ...£	16	18	20	25	22	10	27	10	32	10	25	30	35	40	30	35	40	45	50	40	45	50	55	65	50	55	60	70	85	55	60
Extra, if fitted with Holman's Condenser and Blow-through Valve	£7	£7	£9	£11	£8	10	£11	10s	£12	10s	£9	£12	£15	£15	£10	£13	£15	£16	£22	£13	£16	£16	£22	£22	£16	£16	£23	£24	£35	£17	£17

CONTINUED.

Diameter of Steam Cylinder...In.	10	10	10	10	12	12	12	12	12	14	14	14	14	14	14	14	16	16	16	16	16	18	18	18	18	18	18			
Diameter of Water Cylinder...In.	7	8	9	10	6	7	8	9	10	12	7	8	9	10	12	14	8	9	10	12	14	9	10	12	14	9	10	12	14	
Length of Stroke	In.	12	18	24	24	18	18	18	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	
Gallons per hour		9750	13,000	16,519	20,000	7330	9750	13,000	16,519	20,000	30,000	9750	13,000	16,519	20,000	30,000	40,000	13,000	16,519	20,000	30,000	40,000	16,519	20,000	30,000	40,000	16,519	20,000	30,000	40,000
Price of Special Pump...£	65	75	90	100	75	80	85	110	120	140	110	120	130	140	160	180	140	150	160	180	200	180	190	210	230					
Extra, if fitted with Holman's Condenser and Blow-through Valve	£23	£24	£35	£35	£20	£27	£38	£38	£50	£28	£28	£40	£40	£55	£55	£28	£40	£40	£55	£55	£45	£45	£56	£56						

Intending purchasers of Steam Pumps would do well to observe the great length of stroke, short steam cylinder, and short piston of the "Special" Steam Pump, as compared with the short stroke, long steam cylinder, and long piston of the Pumps of other makers, as the efficiency and durability of the machine, and the space occupied by same, greatly depend upon this. The advantage of long strokes will be obvious when purchasers are reminded that each set of suction and delivery valves of a "Special" Steam Pump with 24 in. stroke, running at 120 ft. per minute, would open and close only 30 times per minute, as against 120 times per minute in a Pump with only 6 in. stroke performing same duty.

The "Special" Steam Pump can be worked by Compressed Air as well as by Steam.

HUNDREDS of these PUMPS are USED for HIGH LIFTS IN MINES, for which purpose they are made with 21, 24, 26, 28, 30, and 32-inch Steam Cylinders, and 36, 48 and 72-inch Strokes.

The following Testimonial gives one Example of the Power Gained by the action of Holman's Patent Condensers:—

NORLEY COLLIERY, WIGAN.

GENTLEMEN.—I have great pleasure in recording my entire satisfaction with the working of the Holman's Patent Steam Pump Condenser which you have supplied to us. The complete condensation of the steam is, apart from its value in the strict economic sense, a most valuable feature in the drainage of underground work-

ings. The perfect manner in which this important result is accomplished by your Condenser is extremely creditable to you, and merits the thanks and commendation of the Mining Engineer. When we start the "Special" Steam Pump the Condenser commences working automatically, and maintains a constant vacuum of 10½ lbs. per square inch, even when we run the Pump upwards of 80 strokes (106 feet) per minute. It may perhaps be interesting to you to know that when we were running the Pump at 84 strokes (168 feet) per minute, the steam gauge

indicating a steam pressure of 26 lbs. per square inch, 80 yards from the Pump and the Condenser vacuum gauge on the exhaust pipe indicating a steady vacuum of 21½ inches, I turned the exhaust steam from the Condenser into the atmosphere, when the speed at once fell to 44 strokes per minute. The working economy thus shown is really so great that the cost of the Condenser must be saved in a very short time.

(Signed) J. THOMPSON.

Great Economy for Millowners! Belting versus Gearing.

Drive your Shafting with Rodgers's Patent Wrought Iron Drums, instead of Gearing.
MANY THOUSANDS IN USE.

ADVANTAGES.

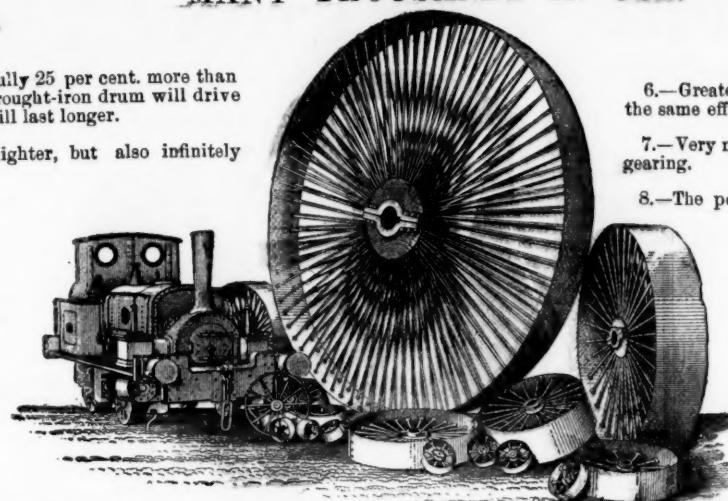
1.—Leather belts on these drums will drive fully 25 per cent. more than on cast-iron ones—viz., a 6 in. wide belt on a wrought-iron drum will drive as much as an 8 in. belt on a cast-iron one, and will last longer.

2.—These drums are not only considerably lighter, but also infinitely stronger than cast-iron ones.

3.—In case of damage from Fire they easily repaired. We have repaired hundreds a small cost.

4.—For MAIN DRIVING purposes they are invaluable, especially in case of a new mill, no expensive ashlar work being required to withstand the jars of costly gearing.

5.—The wrought-iron drums and belts cost less and are more easily fixed than gearing.



ADVANTAGES.

6.—Greater economy in steam power, as it requires less power to transmit the same effective force with belts than it does with gearing.

7.—Very much greater economy in subsequent repairs as compared with gearing.

8.—The power is transmitted evenly, faithfully, noiselessly, and without the jar arising from defective or worn gearing.

9.—They require no cases for transport or shipment.

They can be supplied up to

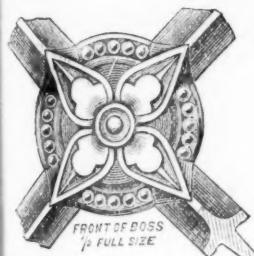
24 FEET DIAMETER.

FOR PRICES AND PARTICULARS APPLY TO THE
SOLE MAKERS,

HUDSWELL, CLARK, AND RODGERS, RAILWAY FOUNDRY, HUNSLET, LEEDS.

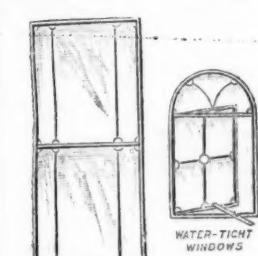
HARRIS'S PATENT WROUGHT-IRON WINDOWS.

DOME AND OTHER ROOF LIGHTS, FLOOR AND PAVEMENT LIGHTS, ETC.

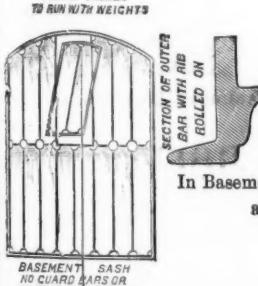


GREAT BRITAIN,
UNITED STATES OF AMERICA,

ARE STRONGER, SUPERIOR, AND CHEAPER
THAN ANY OTHER METAL SASHES YET
PRODUCED—COST LESS FOR GLAZING—
ARE AS CHEAP IN MANY CASES AS WOOD



Private Houses,
Parsonage Houses,
Farm Houses,
Churches,
Chapels,
Schools,



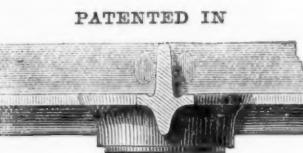
In Basement Storeys and Exposed Positions Shutters
and Guard Bars are dispensed with.

ILLUSTRATED CATALOGUES
ON APPLICATION.

HOME AND

SOLE MAKER—J. T. HARRIS, Engineer, Ironfounder, and Manufacturer,

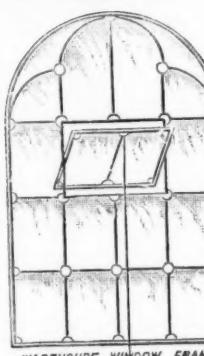
SAFE, STRONG ROOM, AND PARTY WALL DOORS, AND EVERY KIND OF CONSTRUCTIONAL AND BUILDERS' IRONWORK, LIFTS, HOISTS, ELECTRIC BELLS AND TELEGRAPHS, &c.,
80, CANNON STREET, LONDON, E.C.; AND BEAUFORT IRONWORKS, BRISTOL.



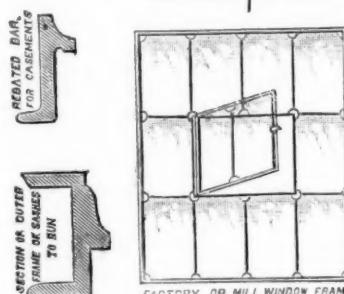
FRANCE,
GERMANY, AND BELGIUM.

CAN BE DESIGNED AND MANUFACTURED
TO SUIT ANY STYLE OF ARCHITECTURE
OR POSITION WHERE A WINDOW MAY BE
REQUIRED.

ARE BEING EXTENSIVELY USED IN—

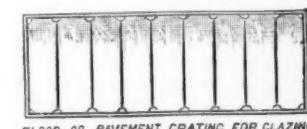
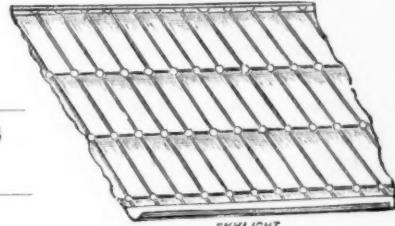
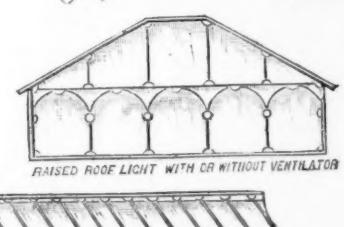


ILLUSTRATED CATALOGUES
ON APPLICATION.



Security is obtained in
these Skylights without
Guard Bars, and with less
obstruction to Light.

EXPORT.



FLOOR OR PAVEMENT GRATING FOR GLAZING

CLARKE AND SUTCLIFFE,

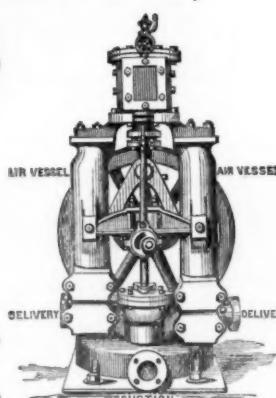
CLARKE'S IMPROVED SCHIELES' PATENT

BLAST AND EXHAUST FANS,

MINE VENTILATORS,
SCHIELES' PATENT TURBINES,
SLATE PLANING,
AND
SAWING MACHINES.
IMPROVED EXCELSIOR
DOUBLE-ACTING STEAM-RAM PUMP.

UNION IRONWORKS,
Rochdale Road, Manchester,

LATE
THE UNION ENGINEERING COMPANY, LIMITED.



THOMAS TURTON AND SONS,

MANUFACTURERS OF

MINING STEEL of every description.

CAST STEEL FOR TOOLS. CHISEL, SHEAR, BLISTER, & SPRING STEEL
MINING TOOLS & FILES of superior quality.

EDGE TOOLS, HAMMERS, PICKS, and all kinds of TOOLS for RAILWAYS, ENGINEERS, CONTRACTORS, and PLATELAYERS.
LOCOMOTIVE ENGINE, RAILWAY CARRIAGE and WAGON SPRINGS and BUFFERS.

SHEAF WORKS & SPRING WORKS, SHEFFIELD.

LONDON OFFICES—90, CANNON STREET, E.C. PARIS DEPOT—12, RUE DES ARCHIVES.
NEW YORK STORE—102, JOHN STREET.

H. WATSON AND SON,

HIGH BRIDGE WORKS,
NEWCASTLE-UPON-TYNE.

MANUFACTURERS OF EVERY DESCRIPTION OF
Engineering Fittings, Colliery Pump Working Bar-
rels, Boiler Alarm Whistles, and Fire Engines.
IRON, COPPER, AND BRASS TUBING.

Gun Metal and Brass Castings of any size.
MALLEABLE BRONZE PRICKERS & BLASTING APPLIANCES.

SAFETY-LAMPS.



N.B.—The whole of these Lamps are made by workmen who have had great
experience, and pass through a careful examination before being sent out.
We also SUPPLY BRASS, COPPER, and COMPOSITION STEMMERS and
PRICKERS, as embodied in the Mine Regulation Act, and made of such lengths
best adapted for Mining purposes.

H. R. M. will exhibit in full operation at the Royal Agricultural Society of England Show, at Bristol, July 10th to 15th, one of his New Patent Stonebreakers, with screening apparatus, and on wheels to travel; also fitted with his new patent toggle bearing and drawback motions, and reversible planed back cubing jaws in sections.

H. R. MARSDEN, PATENTEE AND ONLY MAKER BLAKE MACHINES, ORE CRUSHERS AND STONE BREAKERS,

WITH THE

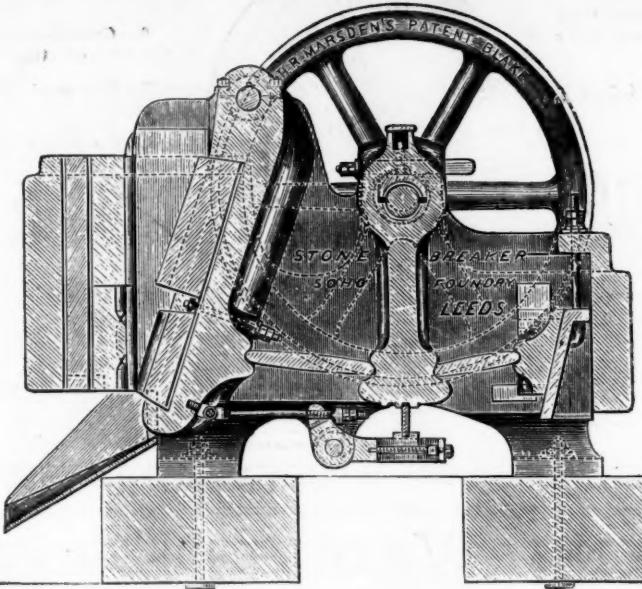
New Patent Reversible
CRUSHING OR CUBING
JAWS,

WHICH ARE CONSTRUCTED OF A PECULIAR
MIXTURE OF METAL, WEARING

Four times longer than any
other.

60 GOLD AND SILVER MEDALS.

OVER 2000 NOW IN
USE.



For Crushing to any degree
of Fineness, or Breaking
to a required size.

Her Majesty's Government
USE THESE MACHINES
EXCLUSIVELY,
ALSO ALL THE GREAT
Mining Companies of the
World.

H. R. M. has long observed the want of cheaper
machines,

STONE AND ORE CRUSHERS.
And has at length, by means of improved appliances
for the production thereof, been enabled to reduce
the prices, yet keep up at the same time the well-
known strength of construction. Reduced prices
on application.

Royal Agricultural Show, Liverpool, July, 1877.

DEAR SIR.—I have broken over 40,000 tons of very hard LIMESTONE into ROAD METAL, for
the Newport and other Road Trusts, in your PATENT STONE BREAKER, AND ALL WITH
ONE PAIR OF JAWS, which are STILL IN USE. I do not think at all, but am quite sure yours
are the only Machines which fully perform the work you set them out to do, and there are none
in the Show can at all compare with them.

Yours, truly,
H. R. Marsden, Esq.

WILLIAM PRICE, Contractor, Gold Cliff, Monmouth.

FIFTY per Cent., and upwards, saved by using these Machines.

TESTIMONIAL FROM MESSRS. JOHN TAYLOR AND SONS.

6, Queen-street-place, May 10, 1877.

DEAR SIR.—We have adopted your Stone Breakers at many of the mines under our management, and are pleased to be able to state that they have in all cases given the greatest satisfaction. We are, yours faithfully,

H. R. Marsden, Esq.

INTENDING BUYERS ARE CAUTIONED AGAINST PURCHASING OR USING ANY INFRINGEMENT OF THE NUMEROUS PATENTS OF H. R. MARSDEN.

ILLUSTRATED CATALOGUES, TESTIMONIALS, and every information, on application to:—
H. R. MARSDEN, SOHO FOUNDRY, LEEDS, ENGLAND.
ONLY MAKER OF SAULT'S PATENT SYPHON CONDENSER.

TO COLLIERY AND MINE OWNERS. R. HUDSON'S PATENT STEEL CORVES OR "TRAMS."

Patented July, 1875, and January, 1877.

Entire new principle, saving three-quarters to 2 cwt. "dead" weight per corve. Will hold 2 to 3 cwt. more coal than the ordinary kind, *without increasing the outside dimensions*. Adopted by—
Messrs. THOMPSON, WISE, & Co., Burry Port, South Wales.
Messrs. DYMOND'S Liversedge Coal Company, near Leeds.
Messrs. W. ACKROYD and BROS., Morley, near Leeds.
Messrs. CLAYTON and SPEIGHT, Farnley, near Leeds.
Messrs. JAS. WORMALD and SONS, Rawdon, near Leeds.
KINGWOOD COAL and IRON CO., near Bristol.
MIDDLETON COLLIERY CO., near Leeds. | NEWTON COLLIERY,
R. HUDSON, Engineer and Ironfounder, Gildersome Street Foundry, near Leeds (Five minutes walk from Gildersome Station, G.N.R.)

Messrs. R. HOLLIDAY and SONS, Ardsley, near Wakefield.
HARDWICK COLLIERY CO., Clay Cross, near Chesterfield.
WEST YORKSHIRE IRON and COAL CO. (LIMITED), Tingley, near Leeds.
W.M. BAIRD and SON, Coatbridge, near Glasgow.
BETTISFIELD COLLIERY COMPANY, Bagillt, Wales.
EDFORD COLLIERY COMPANY, near Bath.
T. VAUGHAN and CO'S TRUSTEES, South Medomsley Colliery; and others.

The Barrow Rock Drill COMPANY

ARE NOW PREPARED to SUPPLY their DRILLS, the ONLY ONES that have been SUCCESSFULLY WORKED in the MINES of CORNWALL. At DOLCOATH MINE, in the HARDEST known ROCK, a SINGLE MACHINE has, since its introduction in July, 1876, driven MORE THAN THREE TIMES the SPEED of HAND LABOUR, and at TWENTY PER CENT. LESS COST PER FATHOM.

In ordinary ends two machines may be worked together, and at a proportionately increased speed. They are strong, light, and simple, easily worked, and adapted for ends and stopes, and the sinking of winzes and shafts.

The company are also prepared to SUPPLY COMPRESSORS, and all necessary appliances for working the said Drills.

Apply to—

LOAM AND SON,
LISKEARD, CORNWALL.

IMPROVED STEEL WIRE FOR ROPES.

WEBSTER & HORSFALL, (ORIGINAL PATENTEE),

MANUFACTURERS OF IMPROVED STEEL WIRE FOR ROPES
FOR COLLIERIES,

RAILWAY INCLINES, PLOUGHS, HAWSERS, &c.
SOLE MANUFACTURERS of the HOMOGENEOUS WIRE for the
ATLANTIC CABLES of 1865 and 1866.

WEBSTER AND HORSFALL.
BIRMINGHAM.

THE GREAT ADVERTISING MEDIUM FOR WALES.

THE SOUTH WALES EVENING TELEGRAM
(DAILY), and
SOUTH WALES GAZETTE
(WEEKLY), established 1857,

the largest and most widely circulated papers in Monmouthshire and South Wales.
CHIEF OFFICES—NEWPORT, MON.; and at CARDIFF.

The "Evening Telegram" is published daily, the first edition at Three P.M., the second edition at Five P.M. On Friday, the "Telegram" is combined with the "South Wales Weekly Gazette," and advertisements ordered for not less than six consecutive insertions will be inserted at an uniform charge in both papers.

P. O. O. and cheques payable to Henry Russell Evans, 14, Commercial-street, Newport, Monmouthshire.

THE IRON AND COAL TRADES' REVIEW.
The IRON AND COAL TRADES' REVIEW is extensively circulated amongst the Iron Producers, Manufacturers, and Consumers, Coalowners, &c., in all the iron and coal districts. It is, therefore, one of the leading organs for advertising every description of Iron Manufacturers, Machinery, New Inventions, and all matters relating to the Iron, Coal, Hardware, Engineering, and Metal Trades in general.

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Remittances payable to W. T. Pringle.

THE "CHAMPION" ROCK BORER

MINE AND QUARRY STANDS, STEEL DRILLS, SPECIALLY PREPARED INDIARUBBER HOSE, TESTED
IRON PIPES, &c.

Air-Compressing Machinery, Simple, strong, and giving most excellent results, and ELECTRIC BLASTING APPARATUS.

Full particulars of rapid and economical work effected
by this machinery, on application.

CONTRACTS TAKEN, OR SPECIAL TERMS FOR HIRE.

ULLATHORNE AND CO., Mechanical and Consulting Engineers,
63, QUEEN VICTORIA STREET, LONDON, E.C.

THE ROANHEAD ROCK DRILL.

BY ROYAL LETTERS PATENT.

This justly-celebrated Rock Drill, the only one invented that will work in the hardest rock without more than the usual repairs required by any ordinary machinery, is now offered to the public.

It has been most successfully worked in the well-known Hematite Mines of Lancashire and Cumberland. Will drive 50 to 60 ft. in hard rock without change of drill, and can be worked by any miner, and kept in repair by any blacksmith. It is the most simple rock drill ever invented, and cannot with fair usage get out of order.

Plans, Estimates, including Compressors, and all other Mining Machinery, supplied on application to the sole makers,—

SALMON, BARNES, AND CO., MINING ENGINEERS.

Canal Head Foundry and Engineering Works, Ulverston.

J. WOOD ASTON AND CO., STOURBRIDGE

(WORKS AND OFFICES ADJOINING CRADLEY STATION),

Manufacturers of

CRANE, INCLINE, AND PIT CHAINS,

Also CHAIN CABLES, ANCHORS, and RIGGING CHAINS, IRON and STEEL SHOVELS, SPADES
FORKS, ANVILS, VICES, SCYTHES, HAY and CHAFF KNIVES, PICKS, HAMMERS, NAILS,
RAILWAY and MINING TOOLS, FRYING PANS, BOWLS, LADLES, &c., &c.

Crab Winches, Pulley and Snatch Blocks, Screw and Lifting Jacks, Ship Knees, Forgings, and Use Iron of all descriptions.

STOURBRIDGE FIRE BRICKS AND CLAY.